THE IRON AGE — August 17, 1933

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..THE IRON AGE..

ESTABLISHED 1855

AUGUST 17, 1933

No. 24

AN OPEN LETTER TO ADMINISTRATOR JOHNSON:

The Iron Age, as announced last week, has joined the rapidly growing ranks of those enlisted under the banner of the blue eagle.

We have done this because we believe in the essential soundness and necessity of the President's program, which calls for reabsorption of the unemployed and for expansion of mass purchasing power.

We do not believe that it is the Administration's intent that those who subscribe to the purposes of the Recovery Act should condone the abuses which opportunism invites into the train of every major social or economic movement.

Let us reiterate frankly, therefore, what we have said before. This great movement will not succeed if, under duress of the emergency, it is permitted to be used for partisan advantage. Nothing will be more resented by the American spirit of fair play.

We believe that the Administration itself has too much at stake in the outcome, as have all of us, to allow the Recovery Act to become a recruiting measure for the American Federation of Labor or any other minority organization of employees or employers.

Thus far, all of us must admit the admirable impartiality of your own attitude.

No less important to the recovery movement than freedom from minority exploitation is a recognition of the plight of many smaller employers, who are unable to obtain credit from their banks to finance the increased cost to them of complying with the provisions of the act.

We ask in particular, at this time, Mr. Administrator, that you devote some of the precious moments of your busy days to finding a way in which these financially pressed employers may conform with the President's intent. Certainly this intent is not that they should be forced out of business, either through lack of ability to meet rising costs or through public boycott.

John S. Vanderwater

Editor, The Iron Age

Choosingth

Group Shafting and Chain and Direct Chain Drives

THE group method, employing shafting and chain, although similar in arrangement to the belting group method, possesses driving characteristics not found in other methods of the flexible system. Chain instead of belting is employed from line-shaft to driven apparatus and frequently from motor to line-shaft or head-shaft as shown by Fig. 8. The belting group and the chain group can be similar to the extent of utilizing either belt or chain from motor to head- or line-shaft and from head- to line-shaft, the determining factor being center distance. If ample center distance is possible it is practicable to use belting in conjunction with the chain group method for the connections mentioned. Based on the short centers possible with chain, it is also at times practicable to employ chain as a connection to line- or head-shaft from motor when employing the belting group method. Chain or the "silent" or "multiple strand finished steel roller" type is always employed from motor to head- or line-shafts enclosed in a steel oil retaining casing. From line-shaft to apparatus the single or double strand finished steel roller type is employed. For this service chain speeds up to 600 ft.p.m. are permissible without the use of oil casings. In excess of this speed they should be used, based on the necessity of a fluid instead of a plastic lubricant.

Uses of the Group Chain Method

This method is particularly adaptable to the driving demands of the process manufacturing industry, because of strength, flexibility and ease of control. Its use in production shops is limited to connecting a motor with a group line-shaft by the silent or multiple strand roller type chain. The arrangement from motor to head-shaft and head- to line-shaft as shown by Fig. 9 is regularly employed in process plants based on short centers, positive transmission and strength requirements. Its chief field, however, in process operations is from the group line-shaft to apparatus requiring slow input speeds coupled with relatively high power demands. For such transmission, chain must be employed if flexibility is necessary because regardless of ample center distance belting is impracticable.

As an example: Four individually controlled mixing vats are arranged in series for group driving. Each vat requires 6½ h.p. at an input speed of 40 r.p.m. to the top bevel pinion shaft. Space limits the receiving pulley on this shaft to 36 in. diameter. The line-shaft of the group operates at 120 r.p.m. Based on the 36-in. diameter pulley and the given speeds the ratio of drive is 3:1, necessitating a pulley on the line of 12 in. diameter. A 12 in.-pulley at 120 r.p.m. results in a belt speed of 380 ft.p.m. Assuming combination tannage leather belting can be employed; it would require a belt 12 in. wide to transmit the load safely, using 75 lb. effective tension. Individual control by the shifting of a 12-in. belt is extremely difficult at a 380 ft.p.m. speed. The finished steel roller chain operating on cut tooth sprockets solves a problem of this character, because of its high tensile strength and its adaptability to friction clutch control. For this particular case a chain of 1¼-in. pitch operating on 8-in. and 24-in. pitch diameter sprockets could be employed without an oil retaining casing. Control could be accomplished

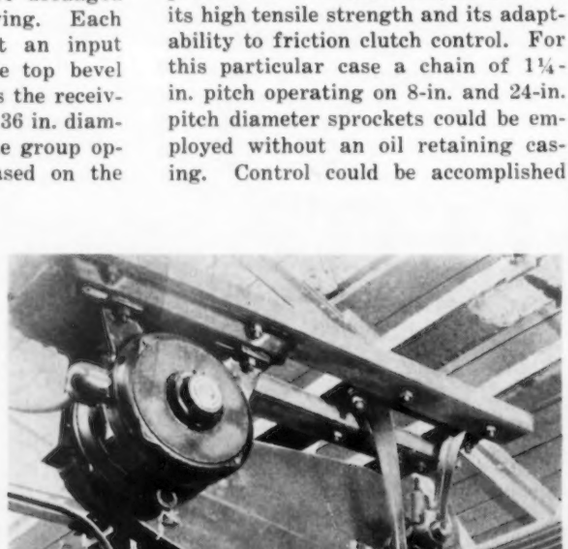


FIG. 8—Center distance is the principal determining factor in the selection of chain drive from line shaft to head shaft as illustrated at right.

gthe Right Drive—2

By WILLIAM STANIAR
Mechanical Transmission Engineer
E. I. duPont de Nemours & Co.

▲▲▲

THIS is the second article in the series on modern mechanical power transmission methods by Mr. Staniar. It is part of an extending series in which he will completely cover the subject of both rigid and flexible transmission systems from the standpoint of choice and adaptation.

In this installment, the author describes the applications of chain drives both direct and in group shafting combination.

Mr. Staniar's series will be of particular interest both because of its thorough and skilled treatment and because of the many developments in this field of transmission during the past 18 months.

by a friction clutch on the line-shaft. Assuming a center distance of 8 ft. 0 in. the cost comparison of belt and chain drive for this installation is given:

From a cost comparison alone, it is obvious that the chain method should be employed.

In driving of this character, starting loads are usually severe. Such a condition causes premature destruction of belting due to the slipping action caused by frequent shifting under strain from loose or tight pulley. By the use of chain this action is avoided because of the friction clutch which is especially designed for this service. In many operations such as described the speed of agitation must not vary. This demand cannot be accommodated by belting because of creep and a certain amount of slip which are always present. Chain driving is positive, therefore the required speed is constantly maintained. In summarizing the applications and characteristics of the group method employing shafting and chain only, the process industry will be considered in the accompanying condensed presentation.

Description of the Direct Chain Method

This method is most applicable for the direct driving of apparatus from motors operating at standard synchronous speeds of 720 to 1800 r.p.m. in both production shops and process manufacturing plants. The type of chains employed are the "silent" and the "multiple strand finished steel roller," because of the high speeds involved. Choice between the two for any given demand is difficult owing to equality in efficiency and performance. However, the silent type due to a wider range of speeds and power capacities is employed more extensively in this field. Both types can be employed either with or without oil retaining casings. Fig. 10 illustrates the silent type with such a device, while Fig. 11 shows it without. Fig. 12 shows the multiple strand finished roller type without casing. While it is possible to operate chains of this character without oil retaining casings, it is not advocated because of better service and longer life resulting from a continuous flow of lubricant to the multiplicity of parts of which such chains are composed. If a drive of this character operates without casing, a soft grease instead of oil must be used as a lubricant. Such lubrication materially shortens the chain life owing to "throwing off" action induced by centrifugal force. Furthermore, a plastic does not possess the penetrating characteristics

Comparison of a Belt and Chain Drive

Belt		
26 ft., 12 in. combination tannage leather @ $4.30	$111.80	
1 12 in. x 26 in. C.I. pulley	12.00	
1 36 in. x 12 in. T. & L. pulley set	36.00	
1 Shifter	10.00	$169.80
Chain		
20 ft., 1¼ in. pitch finished steel roller type @ $1.00	$ 20.00	
1 Cut steel driving sprocket 8 in. p.d.	10.00	
1 Cut C.I. driven sprocket 24 in. p.d.	20.00	
1 No. 12 solid friction clutch 2 15/16 in. bore	25.00	$ 75.00
Difference in favor of chain		$ 94.80

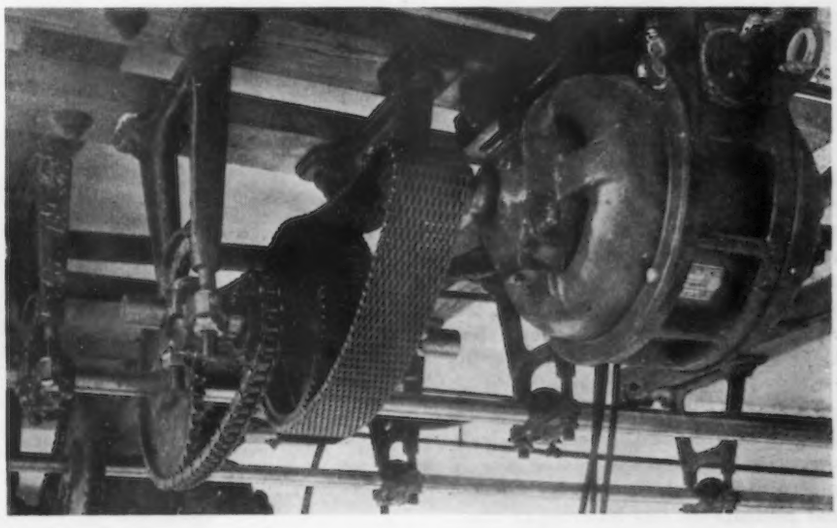


FIG. 9—Short centers, positive transmission and strength requirements dictated the selection of chain for this process plant drive.

Production Shop and Process Manufacturing Plant Driving

METHOD	**Chain direct from motor to apparatus**		
SERVICE	Driving machine and wood working tools, where motor is mounted integrally with machine. Driving machine and wood working tools where input speed is not practicable for direct coupled motor connection. Driving machine and wood working tools where positive speed ratios must be maintained. Driving heavily loaded line- or head-shafts. Driving direct all types of equipment encountered in cement mills, clay working plants, rubber mills, dye manufacturing plants, and similar work where overloads are frequent and where positive velocity ratios must be maintained. Driving individually integral parts of machines where a positive speed differential is required. Where static is a hazard. Under any atmospheric condition, if enclosed.		
CHAIN TYPE	**Location**	**Chain**	
	Machine and wood-working tools direct from motor.	Silent type, enclosed in oil retaining casing.	
	Various direct driven equipment of all process industries.	Silent or multiple strand finished steel roller, enclosed or open depending on speed in ft. p. m.	
LUBRICATION	**Chain Type**	**Chain Speed**	**Lubricant**
	Silent.	Up to 500 ft. p. m.	Fluid grease. Approximately 2 per cent soap content.
	Silent.	500 to 2500 ft. p. m.	Oil of not less than 250 sec. S. U. V. at 100°F. in oil retaining casing.
	Multiple strand finished steel roller.	Up to 600 ft. p. m.	Fluid grease approximately 2 per cent soap content.
	Multiple strand finished steel roller.	600 to 2000 ft. p. m.	Oil of not less than 250 sec. S. U. V. at 100°F. in oil retaining casing.
GUIDING FOR SILENT TYPE CHAIN	**Method**	**Uses**	
	Middle or side flanging of chain.	Where drive is an integral part of the driven machine, choice is merely a matter of convenience.	
	Wire flange on driven sprocket.	Where motors are mounted independently from the driven machine due to possibility of mis-alignment.	
	Plate flange on driven sprocket.	Where heavy side action is anticipated and on high-powered installations.	
	"Duplex" chain.	Where both faces of chain are required to operate with the sprockets.	
SPROCKETS	Driver—generally forged steel. Driven—cast iron or cast steel depending on load requirements.		
HORSEPOWER CAPACITY	Silent type.	Multiple strand finished steel roller.	
	Fractional to 5000.	Fractional to 500.	

PERMISSIBLE R.P.M. OF DRIVING SPROCKETS BASED ON PITCH OF CHAIN

Silent Type								
¾ in. P	½ in. P	⅝ in. P	¾ in. P	1 in. P	1¼ in. P	1½ in. P	2 in. P	2½ in. P
2000 to 5000	1500 to 2000	1200 to 1500	1000 to 1200	800 to 1000	650 to 800	500 to 650	300 to 500	300 and under

Multiple Strand Finished Steel Roller							
½ in. P	⅝ in. P	¾ in. P	1 in. P	1¼ in. P	1½ in. P	1¾ in. P	2 in. P
Max. 2600	Max. 1900	Max. 1500	Max. 940	Max. 645	Max. 520	Max. 370	Max. 325

SPEED RATIOS	**Silent Type**	**Multiple Strand Finished Steel Roller**
	1:1 to 15:1.	1:1 to 10:1.

of a fluid lubricant and therefore seldom reaches the vulnerable parts of the chain. If it is difficult to use a casing, due to structural interference, a fluid grease, low in soap content, should be used and frequently applied. When a casing is employed, the oil level should not allow more than ⅛ in. immersion of the bottom of the chain. If immersed deeper than ⅛ in. a foaming action of the oil occurs, causing heating and losses from leakage. Periodically the casing should be drained of oil, thoroughly cleaned and refilled.

Regardless of installation difficulties the casing should always be used where dust, grit and acid fumes are prevalent. Abrasives and corrosives will not only cause premature chain failure, but will in addition cause rapid wear of the sprocket teeth. A plastic lubricant retains foreign matter, whereas in a fluid lubricant it precipitates. The sprockets for these types of chain are made of forged steel, cast steel and cast iron with cut teeth of special design. The silent chain due to its construction requires guiding on the sprockets. This is accomplished by either the center guide link which fits into a groove in the sprocket, the side links which fit over each edge of the sprocket rim and the plate or wire flange on the driven sprocket.

FIG. 10—Silent type chain drive installation with oil retaining casing.

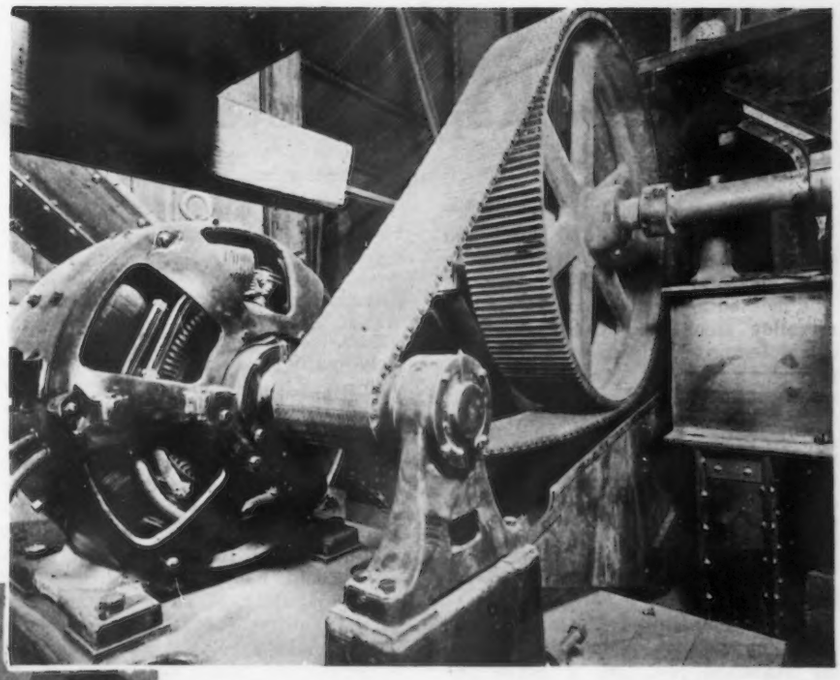
Uses of Direct Chain Drive

In production shop driving, this method is frequently employed as a means of direct connection between motor and machine tool, particularly when the motor is mounted integrally with the tool and the input speed is not suitable for direct coupled motor connection. Certain classes of machine or wood-working tools require comparatively low positive input speeds. For this demand, the silent chain cannot be excelled. In process manufacturing plants direct motor connection by chain is used extensively for the driving of various equipment where flexibility, short centers, and positive speed reduction are essential. Where shock load is occasional and where a positive speed differential of integral rotating parts must be maintained, the silent or multiple strand finished roller chain should be employed, as they possess the "no-slip" characteristic and can be operated on close centers. When of correct size and the driving ratio is within proper limits, these types of chain will outlast other short center methods of the flexible system, based on proper lubrication and protection from injurious matter. Continuous shock loads and

severe vibration should be avoided when using chains of this character, as such a condition results in excessive pin or bushing wear causing pitch elongation. This action also causes wear on the sprocket teeth. Additional attributes of the silent and multiple strand finished roller chains are:

1. No static hazard, particularly when operated in oil.
2. Can be run slack, thus eliminating excessive bearing pressure.
3. No depreciation occurs when idle.
4. Unaffected by atmospheric changes.
5. Action remains perfect after long service.
6. 98.2 per cent efficient.

In summarizing the applications and characteristics of the "chain method direct," production shop and process manufacturing plant are combined in the accompanying condensed presentation on the opposite page.



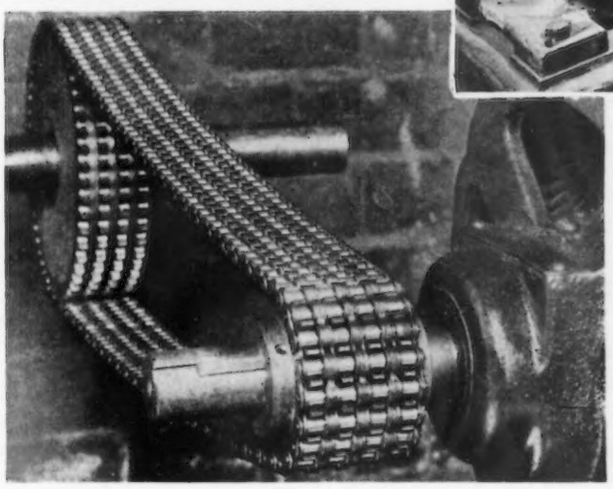


FIG. 11 (above)—Silent type chain drive, like multiple strand roller type may be operated without oil enclosures, but their use is advocated.

FIG. 12 (at left)—A multiple strand finished roller type chain drive, operating without oil casing from motor to countershaft.

Process Manufacturing Plant Driving

METHOD	Group Shafting and Chain		
SERVICE	Driving one and not more than five moderately powered slow speed, high starting torque units. Driving two and not more than five low powered, moderate speed units where belting due to excessive width is not practicable. Driving two and not more than five low powered, moderate speed units where space will not permit adequate belt centres and where belt shifting is not practicable. Where positive speed reduction is necessary. Driving from motor to head and head to line of group.		
CHAIN TYPE	**Location**	**Chain**	
	Motor to head-shaft or line-shaft of group.	Silent or multiple strand finished steel roller types, with oil casing.	
	Head-shaft to line-shaft of group.	Single or double strand finished steel roller type with oil casing.	
	Line to apparatus, having high starting torque, slow speed requirements.	Single or double strand finished steel roller type without oil casing.	
	Line to apparatus, having moderate speed, low starting torque requirements.	Malleable roller type without oil casing.	
BEARINGS	Similar to those specified for group shafting and belting.		
SPROCKETS	Forged cut steel or cast iron for silent chain. Cut cast steel or cast iron for finished steel roller chain. Cast tooth steel or cast iron for malleable roller chain.		
SHAFTING	Similar to that specified for group shafting and belting.		
HORSEPOWER CAPACITIES	Maximum running load for individual equipment — 7 h. p. Maximum size of motor for group — 75 h. p. at all standard motor speeds.		
CHAIN SPEEDS	**Silent**	**Finished Steel Roller**	**Malleable Roller**
	400 to 2500 ft. p. m	200 to 1200 ft. p. m.	200 to 600 ft. p. m
SPEED RATIOS	1:1—15·1.	1:1—8:1.	1:1—8:1.
SHAFTING SPEEDS	Similar to those specified for group shafting and belting.		

Inconel Springs Retain Load Capacity at 700 Deg. F.

Originally developed as a non-corroding container for milk, Inconel alloy, a product of the International Nickel Co., has recently revealed unexpectedly good spring properties at elevated temperatures.

This alloy is produced by adding to nickel sufficient chromium to give surface stainlessness without decreasing the malleability or workability of the material. It has a composition of 80 per cent nickel, 14 per cent chromium and 6 per cent iron. It has excellent resistance to tarnishing and staining, freedom from weld decay resulting from carbide precipitation, and resistance to pitting penetration in the presence of brine solutions.

With a fiber stress approximating 65,000 lb. per sq. in. Inconel springs retain their load-carrying capacity up to 700 deg. F., whereas bronze springs lose many spring properties at about 250 deg. F., carbon steel springs at 350 deg. F., and chrome-vanadium alloy springs at 400 deg. F. In addition, Inconel, it is stated, has excellent resistance to purely oxidizing atmospheres at temperatures as high as 2000 deg. F., and is free from intergranular deterioration in the higher temperature ranges. The alloy is gaining favor with makers of high heat apparatus, and as a spring it is being advantageously incorporated in high - temperature steam - handling equipment.

New Rapid Determination of Aluminum in Co

By DR. C. MORRIS JOHNSON
Chief Chemist, Park Works
Crucible Steel Co. of America

A NEW analytical technique for the determination of aluminum in corrosion-resisting and plain steels has been evolved by the writer. The method is accurate and rapid. A nitralloy steel, for example, can be completed in duplicate from start to finish in 5 to 6 hr. A qualitative test requires about one hour.

The writer has tested this method repeatedly by dissolving known amounts of aluminum with the various alloy steels of no aluminum content, getting complete recoveries. In fact, a uniform blank of two to three milligrams is recovered in excess of the aluminum added at the start.

When the United States Bureau of Standards established its Nitralloy standard No. 106, it asked the writer to give blind results on aluminum content. He determined the same by the method about to be described. He reported 1.06 per cent aluminum to the bureau, and the director then wrote back, stating that the average of all the accepted results was 1.06 per cent.

This method has been in use in the Crucible Steel Co. laboratory for quantitative and qualitative work since January, 1932. It is an outgrowth of the writer's method published in 1919 in *Chemical & Metallurgical Engineering*, (Vol. 20, page 523) whereby Al, Ti, Cr, Zr, U and V can be separated from the bulk of the iron by fractional precipitation of these elements away from the iron in the ferrous state by dilute NH_4OH.[1]

The steel can be dissolved in either dilute HCl, or a mixture of equal volumes of 1:1 hydrochloric and 1:3 sulphuric acids. Steels containing considerable molybdenum with Al dissolve rather slowly in all hydrochloric acid; and the 18 per cent chromium steels, with 8 per cent and higher nickel, are slow to dissolve in sulphuric acid alone.

The No. 106 standard analysis was conducted as follows: 3 gm. and 3.5 gm. for a check, were dissolved in 100 ml. of 1:1 HCl in 800 mm. beakers. Mild heat was applied. For speedy solution, 30-mesh drillings are an advantage. Heat finally to boiling to make sure that all of the steel is dissolved. Then boil down to 40 ml.; cool the solution; rinse down cover glass and beaker walls. Then add 50 ml. of 6 per cent sulphurous acid water. Follow with filtered 1:1 ammonia water until there is a slight but distinct excess. A thick white precipitate of ferrous hydroxide forms. When the ammonia is in very slight excess, some green precipitate will appear on the top of the white hydroxide.

Redissolve these hydroxides, at once in SO_2 water, stirring thoroughly, adding the SO_2 until the solution is nearly clear and smells slightly of SO_2. Avoid a large excess of SO_2 water as it will retard the subsequent precipitation of the $Al_2(OH)_3$. Then add 10 ml. SO_2 water, in excess. Heat at once to boiling. Volume at this point should be about 500 ml.

In five minutes, after boiling begins, the Al appears as a white cloudiness if the Al is of the order of 0.10 per cent. In a nitralloy, it shows as a white flocculent precipitate. This is a rapid qualitative test for Al. Boil ten minutes more. If the Al is below 0.100, it may be discolored with a little basic iron. Some chromium starts to precipitate on further boiling. Boil 10 min. after Al appears.

Remove beakers from heat; add a ⅞-in. diameter ball of wet ashless paper pulp. Stir and, at once, filter quickly through double ashless 12.5 cm. rapid ashless papers. Wash ten to twenty times with SO_2 water. (5 ml. SO_2 water to 500 ml. H_2O). Reject the filtrate. All foregoing operations must proceed with the least possible delay, or too much iron will be co-precipitated with the Al, thereby rendering the subsequent separation of the Al and chromium by a single peroxidation incomplete.

There need not be more than 1 per cent of the total iron and chromium, of the original weight of sample taken, carried out with the white precipitate of Al. Not more iron hydroxides should form, in the peroxidation made later for the removal of the iron, than will cover the bottom of the beaker with a thin layer of iron hydroxide.

After washing the precipitate of the crude hydroxide of Al obtained by the SO_2 hydrolysis, just described, dissolve this Al hydroxide, which will be contaminated by some ferric iron and chromium hydroxide, pouring over the mixture of pulp and hydroxides 50 ml. of 1:1 HCl that has been brought to a boil. This acid is boiled in the beaker in which the fractional precipitation was made, long enough to clean the same. The acid is, therefore, nearly boiling hot after the cover glass and beaker walls have been rinsed down with a water jet. It is thus poured on the mixture of pulp and precipitate.

The pulp must be stirred up with a glass rod during the HCl treatment. Reheat the acid and pour it through

[1]See also "Analysis of Special Steels," fourth edition, John Wiley & Sons, Inc., New York.

NEW analytic methods, particularly for rustless steels, have been developed by Doctor Johnson. In THE IRON AGE of Feb. 12, 1931, he detailed methods for determining carbon, and in the issue of July 13, this year, a new method for analyzing for molybdenum. The accompanying contribution covers aluminum, a following article will discuss a new method applying to titanium and a third article will be devoted to certain oxides in corrosion-resisting steels.

In presenting these methods to the profession, Doctor Johnson believes there is a decided need for a simple and rapid gravimetric method for the determination of aluminum in Nitralloy steels and in the high-chromium steels and so-called 18-8 steels. He is positive this is true in the case of titanium in high-chromium steels.

About a year ago, one laboratory of a plant engaged in the melting of 18-8 steels, with titanium, reported a melt to be of the order of 0.50 per cent Ti. The true content was 1.00 per cent. Two other heats were also reported much too low.

A corporation engaged in the manufacture of titanium products recently requested advice of him

again. A filter rack of six notched holes is the best to facilitate the changing of beakers during this hot acid performance. Wash the pulp, from which the hydroxides have been dissolved, twenty times with H_2O, permitting each washing to drain well before the next one is applied. Then upset the pulp and drench it and the filter with about 5 ml. hot 1:1 HCl; and wash twenty times more, or until the washings no longer taste of acid. The solution and washings are peroxidized to separate the Al from the small amount of iron, as follows:

Peroxidation With Na_2O_2

The above solution and washings are diluted with cold water to 350 ml. in 800 ml. beaker. Project the Na_2O_2 under the partially raised cover glass with a porcelain spoon. (150 mm. long with a bowl about 28 mm. in length, outside dimensions.) This spoon will hold about 2 g. of dry Na_2O_2. Use the "sulphur free" grade which is quite low in Al. Stir well with each addition of the peroxide.

When the solution becomes alkaline, it usually foams up and, at times, quite violently. To make certain of alkalinity, test with litmus paper. Add two spoonfuls excess of the peroxide.

Rinse off the spoon into the beaker and dry the former. Rinse cover and sides of beaker down. The peroxidation takes about three minutes for one sample.

Place the beaker on the stove and bring solution to boil, and boil ten minutes to remove all excess H_2O_2 and precipitate any titanium that may have been dissolved in the peroxidized liquid. After this boiling, remove from heat, stir in the hot solution the same paper pulp that was used in the first filtration of the crude Al hydroxide, and filter through the same double 12.5 cm. No. 31 rapid filter paper. Wash the pulp and precipitate at least twenty times with hot Na_2CO_3, wash consisting of 1½ g. of this salt dissolved in 500 H_2O. This filtrate and washings will contain all of the Al, part of the Cr, no Ti, and considerable silicic acid. The latter tends to separate after a time as a cottony mass floating about. Pay no attention to it.

Precipitation of the Al Hydroxide

Dilute this alkaline filtrate and washings to 450 ml. with H_2O. Cool it in running water till cold. Add to the filtrate 5 drops of the usual phenolphthalein indicator, and a narrow strip of litmus, about ¼ in. wide by ¾ in. long. Now add a slow stream from a burette, with thorough stirring, of cold 1:1 HCl until the red color of the indicator just disappears. Then, a few drops at a time, more 1:1 HCl is dropped in, stirring thoroughly, until the blue litmus floating in the solution looks red. This consumes about 30 ml. of the dilute acid.

At this stage, when the Al content is 0.50 per cent and higher, the Al hydroxide will have formed and again redissolved. If the Al content is low, about 0.100 per cent, it may not show at all until the neutralized solution is boiled a while.

When the litmus strip turns red, then add, at once, a few drops of 1:1 ammonia water until the litmus turns purple but not blue. Lift out the strip and examine it for purple color. It is absolutely essential that these directions are followed, exactly, or the Al hydroxide will run through, or dissolve in part in the subsequent nitrate washing.

Now put the neutralized, faintly alkaline solutions on to boil and boil 10 to 20 min. at least. It may require ½ hr. of slow boiling to cause a low content, of 0.05 per cent, for example, to become visible. It will show plainly if directions are followed closely.

For the low percentage range, from 0.010 to 0.050 per cent, 6 g. are taken for analysis and dissolved in 150 ml. of 1:3 H_2SO_4, or 75 ml. 1:1 HCl + 75 ml. 1:3 H_2SO_4. When the percentage of Al is as low as 0.100 and under, it is sometimes better to continue the boiling of the Al hydroxide slowly for 40 min. A little ashless paper pulp added to these solutions facilitates the boiling, as there is a tendency to gather a head of steam and boil over.

After boiling slowly for about 20 min. for Al steels of the nitralloy type, longer for low Al content, stir in more pulp and filter hot through double 12.5 cm. No. 31 papers. If in a rush, this precipitate can be filtered through two funnels into the one beaker. Wash fifty times, letting each washing drain well before the next one is applied. Wash with a hot solution (need not be over 70 deg. C.) consisting of 3 g. of NH_4NO_3 in 500 ml. H_2O. Filtrate and washings must be boiled at least ½ hr. to make sure no Al has been redissolved in the wash. If some coagulated precipitate forms, this must be filtered on fresh papers, washed and burned in with the main Al which has meanwhile been charring in the muffle furnace. If a mere fine cloudiness forms that does not coagulate and settle, but remains in suspension, this may be either from the indicator or silicic acid. The latter is present in considerable quantity. Such a small cloud can be ignored in the filtrate after the boiling test.

When the Al_2O_3 is pure white, free

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as to the best way to determine Ti in 18-8 as "difficulties" were being encountered. Recently, another steel works laboratory, engaged for years in alloy steel analysis, reported an 18-8 steel to have 0.20 per cent Ti, when the true content was 0.40 to 0.50. The low results were gotten by a "German method," it was stated.

These discrepancies were, in all probability, due to attempts to use the sodium-thiosulphate boiling method which will give accurate results for Ti only when larger amounts of chromium are not present.

The mercury cathode method is accurate but slow and does not separate the aluminum from the titanium. Aluminum is always present in titanium steels made from ferrotitanium produced by reduction processes using aluminum. Such ferrotitanium frequently contains as much as 5 per cent of aluminum. The 18-8 steels are, therefore, likely to be alloyed with 0.04 to 0.20 per cent Al. Also, the cathode method requires considerable outlay for platinum and metallic mercury. The latter should be redistilled frequently, which is expensive as rather costly glass stills are only good for a few runs and then crack.

of char, cool it, weigh, and add, a drop at a time, about 30 drops of 1:7 H_2SO_4 from a dropping bottle. This device is an indispensable aid. Then add about 1 ml. of HF. When the Al_2O_3 is ignited free of paper at a low red heat, it will dissolve perfectly clear in the mixture of these two acids; usually in the cold. Titanium oxide similarly treated requires heat to dissolve it.

Evaporate this solution dry on the hot plate, being careful not to boil the solution during the evaporation. For this solution and evaporation, it is a great advantage to use crucibles of low wide shape, giving much more bottom area. This greatly minimizes danger of loss by spattering.

Low, Wide Crucible Used

The writer had the following dimension crucibles of platinum-rhodium made for this work. Top diameter 1⅝ in., bottom diameter 1⅜ in., and height 1⅜ in., weight 48 g., including lids; capacity, 40 ml. This shape is so satisfactory on account of freedom from upsetting and spattering and denting (heavy wall and platinum-rhodium stiffness) that it is the writer's intention to standardize his new crucibles on this shape or lesser capacity where desirable but of the same low, wide-bottom form.

Remove excess H_2SO_4 by heating. The following procedure is quite satisfactory: Heat on a hot-dog plate. A four-burner affair with individual control can be regulated to a nicety. These perforated burner parts should be of heavy cast iron and will last a long time without repairs. The only precaution is to oil the white handle controls about once a week to prevent sticking. Always regulate at each handle and not at the main valve, for the avoiding of frozen valves. The stands are cheap to operate and will last for years with no expensive replacements.

Having thoroughly dried the silica free Al_2O_3 from most of the SO_2, place crucible on some type of Bunsen burner. Carefully raise the heat, this time, with the lid on, to redness. Then five minutes at yellow heat. Cool and weigh rapidly, or one or two milligrams of moisture may be absorbed if weighing is slow.

The weight of Al_2O_3 so obtained is calculated to metal by the factor 0.529. From this weight is deducted the blank obtained by putting a similar type of steel through all operations. To the same weight of such a steel is added pure aluminum drillings of 99.8 per cent Al. For example: for a nitralloy steel blank, 0.030 and 0.035 g. of Al are weighed in with the non-Al drillings. By the foregoing technique, a normal excess (blank) will be close to 0.002 g. of Al, which is deducted from the Al found in the nitralloy before calculating the percentage. By so doing, the following results were obtained from the No. 106 steel, at different times:

TABLE I—Results Obtained With No. 106 Nitralloy Standard

Al, Per Cent	Blank Deducted
1.075	0.0025 g. Al
1.054	0.0020
1.069	0.0015
1.050	0.002
1.040	0.002
1.05	0.002
Average 1.0576	

Where the control standard steel is lower in chromium than the unknown sample being tested, dichromate is weighed in with the control to bring its chromium content close to the sample. Likewise, vanadium can be added as V_2O_5 at the start, and molybdenum as molybdic acid. Or a similar molybdenum steel can be selected to which Al drillings are added. If the sample is dissolved in dilute H_2SO_4, then first dissolve the Al in a small beaker with 10 ml. of 1:1 HCl and rinse this solution into the beaker in which the sample is to be dissolved.

Decidedly the best way to clean the crucibles for the next analysis is to fill them nearly half full of $K_2S_2O_7$ and heat them gradually to red heat half way up for 2 min. or so with lids on tight. Then cool. The fused cake of bisulphate will usually drop out, leaving the crucible clean and bright. A brief boiling in dilute HCl will remove all bisulphate. This method has much to recommend it as superior to sodium carbonate fusions for cleaning purposes. Prolonged fusions with either flux cause loss of platinum.

When the Al content is low, several determinations can be made without removing the residues from previous tests. Start with the last recorded silica free weight. This is not advisable when the Al is in excess of about 0.100 per cent, with a 6-g. sample taken.

The determination in duplicate can be completed in 6 hr. comfortably or less time in the nitralloy types, dissolving in 1:1 HCl. Results should check as indicated in the No. 106, which results were reported to the bureau as blind determinations.

Usually the percentage of Al in this grade of steels is low, of the order of 0.30 and lower, mainly less than 0.100 per cent, carried into the steel in some cases with the titanium added. The ferrotitanium made by the thermit process frequently contains 5 per cent Al. Also Al is added for experimental purposes. If the Al is of the order of 0.100, the method given for the nitralloy answers well. But if the content ranges from 0.01 to 0.05, with very high Cr, it is advisable to use larger amounts, i. e., 6 g. This complicates matters.

15 Per Cent Chromium Stainless Material

The writer has analyzed such steels by solution in 100 ml. of 1:3 sulphuric acid. Then proceeded exactly as in the nitralloy method to the point where the hydroxides have been redissolved in the 6 per cent H_2SO_3, and 20 ml. excess of this SO_2 water has been added. Then the solution is boiled slowly until the clear solution becomes cloudy, and then 10 to 20 min. extra boiling. If the percentage is under 0.100, this cloudiness may not appear until 40 min. slow boiling has elapsed and may be of a white color, but if the Al is only 0.03, or thereabouts, the turbidity may be colored, of a rusty cast. For control (to similar steels without Al) 0.003 g. Al and 0.002 g. Al were added to the U. S. No. 73 standard. To bring No. 73 content to 18 per cent Cr, 0.500 g. of $K_2Cr_2O_7$ was also weighed in with the drillings. The Al is dissolved in a little 1:1 HCl, converted to sulphate and put in with the drillings and then the 100 ml. 1:3 H_2SO_4. Of course the 6 g. samples will require more sulphurous acid, to redissolve the hydroxides obtained with the slight excess of 1:1 NH_4OH. By the prolonged boiling in such steels the following were obtained from known amounts:

TABLE II

Al Added, Grams	Al Found, Grams	Blank to be Deducted From Tests
0.00298	0.00497	0.00198
0.0000	0.0026	0.0026
0.00297	0.0044	0.0015

By deducting blanks gotten with respective runs, the steels being determined checked as follows:

	Per Cent Al
No. 60 steel	0.037 0.030
No. 61 steel	0.073 0.062

TABLE IV—Al, Fe and $K_2Cr_2O_7$ Found in Filtrates, Milligrams

	Mixtures	In First Peroxidation 90 g. $(NH_4)_2SO$ Present	In Second Peroxidation No $(NH_4)_2SO_4$ Present
1	19 mg. Al	Traces	19 mg. +
	30 mg. Fe	29 +	traces
	20 mg. $K_2Cr_2O_7$	19 +	traces
2	29.97 mg. Al	Traces Al	28.89
	30 mg. Fe	29 + Fe	trace
	30 mg. $K_2Cr_2O_7$	29 + $K_2Cr_2O_7$	trace

TABLE V—Aluminum Recoveries From Controls When Analyzing Other Steels for Aluminum

	Added Al, Gm.	Al Found, Gm.	Blank to be Deducted, Gm.
High chromium stainless steel	0.005	0.0077	0.0027
	0.010	0.0128	0.0018
Chrome-vanadium steels	0.010	0.0125	0.0025
	0.005	0.0072	0.0022
	0.005	0.0066	0.016
High Mn. nickel steel	0.0050	0.0071	0.0021
	0.0070	0.0096	0.0026

4 to 6 gm. of sample were taken in the above steels.

AN interesting analytical fact deduced by Dr. Johnson is that ammonium salts, if present in large enough amounts, will prevent the separation of Al from Fe by the wet peroxidation practice as described in this contribution. On the other hand, the same salts in no degree interfere with the extraction of Cr from the Fe. However, a very much greater excess of the Na_2O_2, about four times as much as is necessary to part the Cr from Fe, will accomplish the same result for the Al when a great excess of ammonium salts is in the solution.

The advantages of using a gas-heated hot plate with four individually controlled cast iron perforated burners, for low first cost, cheapness of operation, and freedom from costly replacements, are set forth. The best size is 24 x 18 in.

A low, wide form of heavy-wall platinum-rhodium crucible is described as most suitable for this work and many other analytical separations.

Analytical methods should be given in as full details as working drawings and specifications for complicated pieces of machinery to be of instant value to the analyst. In the descriptions it has been the author's aim to meet this ideal.

These steels can be analyzed for Al exactly as in nitralloy steels. Also by the method of precipitating the Cr, Ti, and Al away from the bulk of the ferrous iron by adding to the hot sulphurous solution 1:1 NH_4OH until there is no longer any smell of SO_2, only a faint smell of ammonia. This will necessitate two peroxidations. The chromate solutions filtered free of iron and Ti from the two peroxidations (as described fully in an article to follow on titanium determinations) will contain all of the Al. Not over 3 to 3.5 g. should be taken. The 18-8 steels, sometimes, especially if drillings are of the thick, chunky type, may be very slow in reaching final solution in 1:3 H_2SO_4. Such steels dissolve very much better in 1:1 HCl.

If the latter acid is used, 6 g. can be dissolved in 125 ml. 1:1 HCl and most of the free acid removed by boiling down to at least one-half volume. Then proceed with neutralization, redissolving in excess SO_2 water. Boil for 10 min. after coagulation occurs. Two peroxidations will be necessary as more iron will be coprecipitated. And as iron increases, the separation of Al and Cr by peroxidation is greatly impeded, the Cr and Al tending to remain with the iron. (The presence of much ammonia salts must be avoided as these cause the iron to retain the aluminum, strange to say, but not the chromium. Will treat of this later.)

The following very satisfactory results were obtained:

TABLE III

Al Added, g	Al Found g.	Blank to be Deducted
0.00998	0.0115	0.00155
0.00499	0.00656	0.00157
		Al, Found Per Cent
18-8 steel, No. 013, 6 g.....		0.190
5 g.....		0.210
18-8 steel, No. 704, 6 g.....		0.130
5 g.....		0.126

The larger amounts of sample require more of the sulphurous water to redissolve the hydroxides. In 6-g. samples as much as 200 ml. will be required for the redissolving of these precipitates. In general 3-g. samples are more convenient to handle and there is much less coprecipitation of the iron.

TABLE VI—Known Amounts of Al Added to U. S. Bureau of Standards No. 72, a Cr-Mo-Non-aluminum Steel; Al Recoveries From Single Peroxidations

Al Added, Gm.	Al Recovered, Gm.	Blanks to Deduct, Being Excess Recoveries, Gm.
0.0349	0.0370	0.0021
0.0299	0.0314	0.0015
0.0349	0.0370	0.0021
0.0349	0.0371	0.0022
0.0299	0.0323	0.0024

Many similar control examples could be cited obtained when running nitralloy steels.

When NH_4OH Prevents Separation of Al From Fe

The writer encountered the fact that the presence of considerable salts of NH_4OH almost completely prevents the separation of aluminum from iron by peroxidation when determining some titanium by the mercury cathode method. These steels had been found to contain from 0.12 to 0.20 Al by the foregoing methods by hydrolysis. Much free sulphuric acid was present in the mercury cathode solutions. It was added after the mercury cathode process had removed most of the Cr and Fe but of course not the Al. This excess of H_2SO_4 was then nearly neutralized with NH_4OH. On proceeding to remove the total Ti and the small amount of Fe from the residual Cr by the wet peroxidation, strong ammonia fumes were noted as soon as alkalinity was reached. The usual excess of two spoons full of Na_2O_2 were added. The solution boiled 10 min. and the chromium was separated by filtering out the Fe and Ti (and Al!). On neutralizing the yellow chromate and boiling no traces of Al appeared in either steel. Al, therefore, must be with the iron and Titanium, in spite of peroxidation and great excess of free NH_4OH.

On redissolving this iron and titanium and peroxidizing again, it was apparent that a good separation of Cr had been gotten in the first peroxidation, the alkaline filtrate from the second peroxidation being free from yellow chromate color. But on neutralizing this latter solution the Al appeared promptly, there being no ammonia present. Later this interesting fact was further demonstrated. Some Fe-Cr-Al mixtures were dissolved in HCl and fumed with 80 ml. 1:1 H_2SO_4. These solutions were diluted; heated till all was in solution and then just neutralized with ammonia. Then 50 ml. 1:1 HCl were added and the usual peroxidations were made. The chromium was found in the chromate filtrates from the first peroxidations but no Al appeared on neutralizing with 1:1 HCl, making faintly ammoniacal and boiling.

The iron hydroxides from the first peroxidation of the mixtures were next dissolved from the filters with 50 ml. 1:1 HCl as usual and second peroxidations were made. The alkaline filtrates from the second peroxidation showed only a faint trace of Cr color but all of the Al was found in them on neutralizing, making faintly ammoniacal and boiling. See Table IV.

Preparation of Sulphurous Acid of 6 to 8 Per Cent Strength

It is considerably cheaper to prepare the sulphurous acid in the laboratory. The writer uses the cylinder containing 6 lb. SO_2. The gas is run into two liter bottles filled with cold, distilled water. When it is evident that the gas is not being absorbed any further, test the liquid and when it shows a specific gravity of 1.02 to 1.03 stop the stream. Keep the sulphurous solution in a cool place, as it soon loses its strength if warm. Rubber stoppers are better for these so-called 5-lb. solutions, as glass stops are liable to fly out with considerable force. About 70 lb. of the 6 to 8 per cent acid can be gotten from one cylinder.

TABLE VII—Aluminum Added to 0.92 Per Cent Molybdenum Steel and Chrome-Vanadium Steel

Weight of Sample, Gm.	Al Added, Gm.	Al Found, Gm.	Blank, Gm.
3.0	0.0299	0.0317	0.0018
3.5	0.0399	0.0419	0.0020
Added 0.100 gm. MoO_3 to 3 gm. "30 C" U. S. Cr. V. Steel.....	0.0299	0.0314	0.0015

Producing Gray Iron in Acid Electric Furnaces

RAPID strides have been made in recent years in the production of gray iron of high quality in electric arc furnaces. This development undoubtedly is a potent factor in the maintenance of the gray iron industry on a high plane in meeting competition from other products.

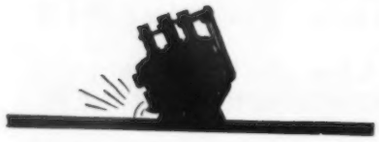
Experience in the use of the electric furnace was recounted in a paper, entitled "Gray Iron Production in the Direct-Arc Acid-Lined Electric Furnace," by Clyde L. Frear, metallurgist, De Laval Separator Co., Poughkeepsie, N. Y., presented at the recent convention of the American Foundrymen's Association. Brief reference to Mr. Frear's discussion was made in a report of the convention proceedings in THE IRON AGE of June 29, page 1041.

In outlining advantages of the electric method over the cupola, Mr. Frear enumerated the following facts:

1. Much cheaper grades of raw material may be used without detracting from the quality of the castings.
2. The electric furnace process is particularly flexible. The bath can be held as long as desired, it can be heated to any desired temperature, and the composition and physical properties may be changed as desired during the melting and refining process. If a ladle of iron should cool too far, it may be returned to the furnace without being pigged.
3. In periods of low production, much smaller heats may be economically made than in the cupola.
4. With the ease of superheating the metal and consequent high refining and solution of the graphite, ladle additions of alloys should be much more effective than with metals only partially refined.

Control of Graphite Particles Important

In discussing the metallurgical problems involved, the author stated that the properties of the finished casting are almost entirely dependent upon the amount, distribution, shape and size of the graphite particles. There may be several gray irons of



identical chemical composition, even to the content of combined carbon and graphite, yet these irons will have different physical properties and machining qualities. The chief items of control, therefore, in the production of iron with specified physical properties are, first, the composition of the bath itself, and, second, the control of the graphite precipitation in the casting when poured.

The strength of the iron, Mr. Frear asserted, will depend to a certain extent upon the various constituents of the metallic matrix, just as the strength of steel varies with the carbon content, the grain size and the form of the various constituents. The effect of these latter variables, however, is much less than the effect of the size, form and number of the graphite inclusions, which weaken the metals.

Control of the graphite particles depends on several important factors —amount of steel scrap used; presence of silicon coming from the charge or from reactions between the metal slag and the lining of the furnace, only acid practice and non-alloy irons being discussed; rate of cooling; temperature of the melting and refining; addition of small amounts of soft pig iron; long holding at high temperatures accompanied by excessive refining and the correction of this.

No Difficulty Experienced in Using Cast Iron Borings

No difficulty has been encountered by the author in using cast iron borings in the electric furnace. In his plant, he states, all cast iron borings resulting from manufacturing operations are remelted. No exact data have been obtained on the melting loss when borings are used, but this loss does not exceed 10 per cent. The borings are not subjected to any treatment before melting but are used just as they come from the shop.

In the author's discussion of melting practice, many details are included, such as charging, melting down the charge, control of slag, finish melting, adjusting the composition, raising to finish temperature, continuous melting, correcting the increase of silicon in the bath, and effect of holding at low temperature. Several tables of typical melts are furnished, one of which is here reproduced.

In his remarks on the heat recorded in this table, the author states that no pig iron was used in the original charge and no silicon was added until the original charge was melted and the desired amount of carbon dissolved. At 2:40 p. m. a small amount of steel scrap was added, along with the returns to reduce the silicon content, and some pig iron to counteract the refining due to holding 2 hr. and to the addition of steel. The total carbon and the silicon were held within very close limits during the entire heat, and the combined carbon was normal for a high-grade, soft but close-grained iron. The iron in the heat was melted for castings which must withstand considerable hydraulic pressure and yet be easily machinable.

Some photomicrographs show a reason for the increase in strength of iron made by the electric process. A comparison of the graphite in the iron when first melted with that after refining for 1¾ hr. shows a large reduction in size of primary graphite flakes due to refining. Either there were fewer graphite flakes formed in the molten and pasty iron or there was less chance for growth of these flakes before the iron solidified. Probably both conditions occurred as a result of the solution of a large proportion of the graphite nucleii present in the iron when first melted.

FURNACE RECORD AND COMPOSITION OF ELECTRIC FURNACE HEAT

Charges		Material Charged, Lb.								
Charge No.	Time	Returns	Steel Scrap	No. 1 Machinery Scrap	Automobile Scrap	Pig Iron	Fe-Si (50 Per Cent)	Fe-Mn (80 Per Cent)	Fe-Ph (23 Per Cent)	Coke
Orig.	9:45	484	836	1100	1023	...	...	...	...	66
1	12:30	627	...	...	...	...	31.8	...	...	...
2	2:40	264	88	...	...	88	...	...	...	...
3	3:45	385	...	...	...	...	8.8	10.3	15.4	...

Chemical Composition:

Test	Time	Total Carbon	Graphite	Combined Carbon	Silicon	Manganese	Phos.	Sulphur
A	1:00	3.38	...	...	2.27	0.50	0.42	...
B	2:45	3.32	...	...	2.20	...	...	...
C	3:00	3.35	...	...	2.20	...	...	...
D*	4:30	3.40	2.83	0.57	2.24	0.67	0.51	...

*Test bar "D" cooled overnight in sand.
Power on low tap at 11:00 a. m.
Metal poured at 2:00 p. m. and 4:00 p. m.

Low-Nickel Cast Iron

NICKEL additions of only 0.4 per cent gave the most favorable results in the case of hollow cylinders of gray iron that were polish ground inside and out, to be made into piston rings, according to Dr. Ing. Carl W. Pfannenschmidt, foundry metallurgist of the Humboldt-Deutz Motor Co., Cologne-Deutz, Germany. He mentioned the subject in the course of a paper on alloyed gray cast irons presented before the annual conference at Cardiff, Wales, late in June, of the Institute of British Foundrymen. Also, in the manufacture of four-cylinder blocks for gasoline engines, he found that with an addition of 0.5 per cent of nickel thin flanges could be machined exceedingly well.

CHART OF BASING POINTS for the IRON AND STEEL INDUSTRY taken from CODE OF FAIR COMPETITION

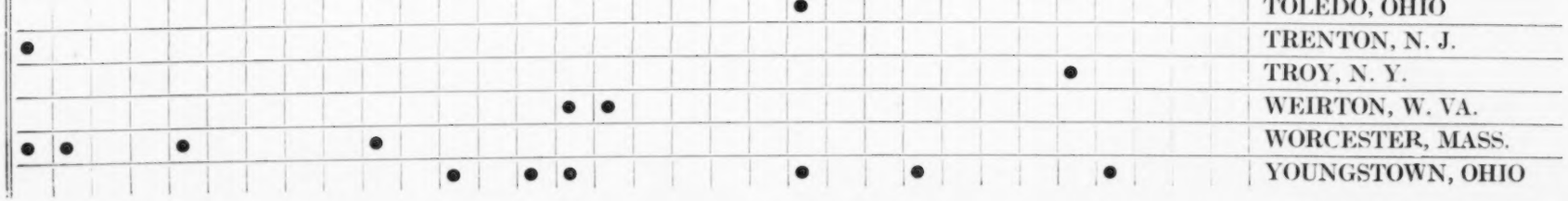
	ANDERSON, IND.	BETHLEHEM, PA.	BIRDSBORO, PA.	BIRMINGHAM	BUFFALO	BURNHAM, PA.	CANTON, OHIO	CHICAGO	CLEVELAND	COATESVILLE, PA.	COLUMBIA, PA.	CREIGHTON, PA.	DANVILLE, PA.	DETROIT	DOVER, N. J.	DULUTH, MINN.	ERIE, PA.	EVANSTON, ILL.	EVERETT, MASS.	GARY, IND.	GRANITE CITY, ILL.	GULF PORTS (1)	GULF PORTS (2)	HAMILTON, OHIO	JERSEY CITY, N. J.	KANSAS CITY, MO.	LEBANON, PA.	LORAIN, OHIO
Bale ties				●				●	●							●						●						
Bars—alloy steel, hot rolled		●			●		●	●																				
Bars—cold finished: carbon and alloy					●			●	●											●								
Bars—concrete reinforcing				●	●			●	●											●		●						
Bars—iron						●					●	●	●		●										●		●	
Bars—merchant steel				●	●			●	●											●		●						
Bars—tool steel		●																										
Girder rails																												●
Ingots, blooms, billets, slabs				●	●			●	●											●								
Light rails: less than 60 lb. per yd.				●				●																				
Mechanical tubing							●							●														
Pig iron—fdry., malleable, O. H. basic, Bess.		●	●	●	●			●	●					●		● (3)	●		●		●			●				
Pipe, rigid electric conduit																		●										
Pipe—std. line pipe and oil country tubular prods.																				●								●
Plates				●				●		●										●		●						
Railroad angle bars				●	●			●																				
Railroad tie plates				●	●			●																		●		
Railroad track spikes				●	●			●	●		●														●	●	●	
Sheet bars					●		●	●	●																			
Sheets				●																●								
Skelp					●			●		●																		
Steel sheet piling					●			●														●						
Strip steel—cold rolled									●																			
Strip steel—hot rolled								●																				
Structural shapes		●		(4) ●	●			●														●						
Tin plate, tin mill black plate and terne plate																				●								
Tube rounds				●	●			●	●																			
Wire—drawn, except as hereinafter specified	●			●				●	●							●								●				
Wire nails, staples, barbed wire and wire fencing	●			●				●	●							●					●							
Wire rods				●				●	●																			
Wire—spring								●	●																			
Wire—telephone								●	●																			

(1) GULF PORTS: Mobile, Ala., New Orleans, La., Orange, Tex., Port Arthur, Tex., Beaumont, Tex., Baytown, Tex., Galveston, Tex., Houston, Tex.
(2) GULF PORTS: New Orleans, La., Galveston, Tex., Houston, Tex. (drawn wire only).
(3) PIG IRON — Duluth, Minn. (except O. H. basic).
(4) SHAPES: Birmin
(5) PACIFIC COAST

Code Basing Points for Iron and Steel Inc

(4) SHAPES: Birmingham, Ala. (Standard shapes only).
(5) PACIFIC COAST PORTS: San Pedro and San Francisco, Cal., Portland, Ore., and Seattle, Wash. San Diego, Cal., for plates and struc. shapes.

or Iron and Steel Industry



TOLEDO, OHIO
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Electric Resistance Welded Boiler Tubes

By J. S. ADELSON
Metallurgist, Steel and Tubes, Inc., Cleveland

THE tubes in a boiler can rightfully be considered the heart of the boiler, because the very life of the boiler depends upon them, and consequently it is of prime importance that they meet such requirements as ductility and uniformity, that they should not be susceptible to premature failure at any localized point because of inherent defects in the material from which they are made, and last, but not least, that they should offer maximum resistance to corrosion and erosion and thus insure a long service life for the equipment in which they are installed. This applies to all tubular boilers, whether water tube or fire tube, whether low pressure or high pressure, whether heating, miniature or power boilers.

Those properties of boiler tubes which can be determined by inspection and physical testing are closely controlled by standard specification A-83 of the American Society for Testing Materials. This specification, which is considered as standard for boiler tubes, is incorporated in toto as material specification S-17 in the Boiler Construction Code promulgated by the boiler code committee of the American Society of Mechanical Engineers, and is also used as a basis for most of the specifications which are issued by the many consumers of boiler tubing.

These specifications include flanging, flattening and crushing tests, the primary object of which is to determine the ductility of the steel and its ability to withstand the fabrication placed upon the tubes when they are assembled into the boilers. These tests are made on a certain percentage of each lot of tube, and in addition each individual length of boiler tubing must be hydrostatically tested to a fiber stress of about 16,000 lb. per sq. in., to insure against failure after the tube is installed in service. The test pressure used is sufficient to guarantee a high factor of safety. The rest of the specifications cover analysis, size, uniformity and such other details which are apart from physical properties.

These specifications, of course, cannot guarantee that each individual tube can be inserted in the tube sheet, roller expanded, flanged against the sheet and otherwise processed without showing a crack or defect at any point around its periphery. In other words, with all precautions taken as covered by the specifications and the rigid inspection to which the tube is subjected before it leaves the manufacturer's plant, the acid test is placed upon the tube when it is installed for use in the boiler.

The existing specifications cover seamless and lap-welded tubes because past experience has proved that these two classes of tubing meet the rigid requirements of a boiler tube. In recent years, great progress has been made in the manufacture of steel tubing electrically welded by the Johnston process controlled by Steel and Tubes, Inc., and about two years ago serious consideration was given to the availability of these tubes for boiler tubes.

It is well known that the weld on this tubing is as strong or stronger than the parent metal; the method of testing in the shop is to expand the tubing over a cone until fracture occurs—the fracture must take place away from the weld else the tube is not considered satisfactory and is rejected. The ease of fabrication in many of the commercial applications of this electrically welded tubing is ample testimony that the weld has high ductility and need not be taken into consideration in the handling of the tube, since in many cases the tubes are bent, beaded, flanged and otherwise distorted but the weld does not fail. Many other present-day uses of this tubing require a product which must be free from any zone of weakness, and more and more tubing is being used for such service. All in all the past experience with this tubing has proved that there is no reason why it should not be adaptable to boiler use, since the weld is reliable.

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A STRONG case is here made for the use in boilers of tubes made by the Johnston process of electric resistance welding. An important feature is that the tubes are normalized in the final steps to produce recrystallization and thus to secure complete uniformity throughout the material. The tables of tests are an impressive item of this brief.

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Johnston Welding Process in Brief

The fundamentals of the Johnston welding process are undoubtedly familiar to most readers and only a brief outline will be repeated here for those who are not conversant with it. Strip steel of accurate width (obtained by running the strip through a pair of rotating circular shears) is sent through a series of rolls of varying contour, which take the flat stock and form it into a butted tube. This butted cylinder is passed directly under a pair of copper rollers or disks which act as electrodes, each of which makes contact with the surface of the tube on one side of the seam.

These electrodes together encompass somewhat less than 180 deg. of the circumference of the tube, the lower half of the tube being supported under the electrodes by a pair of steel rolls which act to exert pressure upon the sides of the tube at the instant of welding, and thus force the edges of the seam into contact. No extraneous metal is added during the welding operation, the weld resulting from the joining of the edges themselves. The principle is similar to electric resistance welding in that heat is generated by the resistance of the metal to the flow of a current of high amperage, and pressure is applied to the edges; but here the similarity ends.

The Johnston process is continuous, which includes both forming and welding carried out at a high speed (as compared with other welding methods), and the weld is completed in the mere fraction of a second. The amount of metal extruded both inside and outside the tube is very small because the factors affecting the welding process, namely, pressure, temperature, contact and speed, have been so correlated as to weld the edges of the

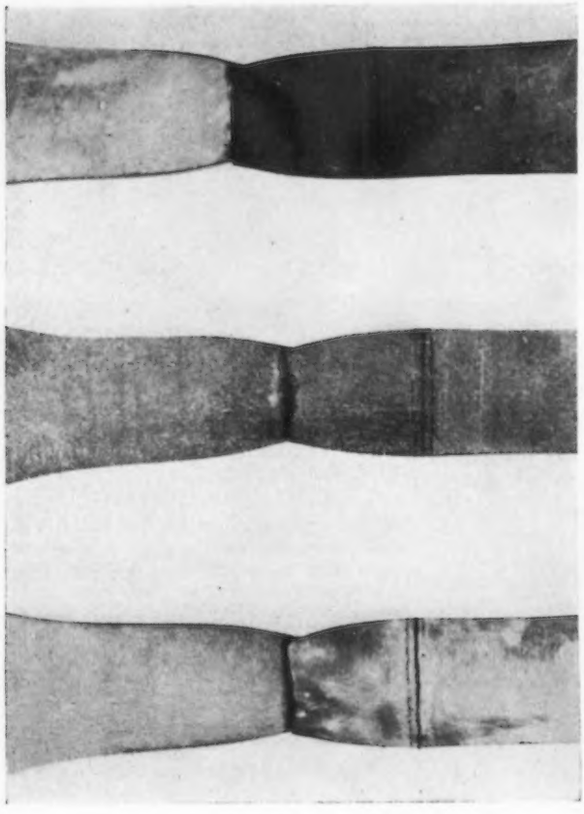

FIG. 4—Three broken transverse tests made from tube sections show the location of the weld with reference to the point of failure.

steel only, and heat does not penetrate into the body of the metal.

The weld is referred to as an edge surface weld. A photomicrograph, Fig. 1, at 100 diameters, of a tube directly from the welding machine shows the microstructure in the weld zone. This can be compared with Fig. 2 of a stationary butt weld made on two pieces of flat steel. Note how little change takes place in the shape of the grains in Fig. 1 compared to the sharp overheated structure in Fig. 2. The penetration of the heat from the joint has produced a change in microstructure for only a very short distance from the joint, Fig. 1.

The carbon in the weld area of the tube has been changed to a sorbitic state—the steel at the weld can be compared to a steel subjected to a mild quench. This has only resulted in an increased tensile strength, somewhat higher hardness and with but slight reduction in ductility. A slight increase in grain size adjacent to the weld and an actual decrease at the joint itself sometimes takes place, but neither of these materially affects the properties of the weld. Cleanliness, of paramount importance in a welded joint, is another important factor in the strength of this tube; the weld is free from inclusions, blow holes and similar defects because the process of welding is such as to prevent these defects from being present. All the above are responsible for the strength and high ductility of tubing welded by the Johnston process.

TABLE I—Bursting Tests of Electric Resistance Welded Boiler Tubes

Test No.	Nominal Size, in.	Length Tested, Ft.	Bursting Pressure lb.	Fiber* Stress lb. sq. in.	Maximum OD (away from) (ruptures)	Expansion in.	Location of Failure
1	1-½ OD x 13 BWG	10	7,500	56,000	1.662	0.162	Opposite Weld
2	1-½ OD x 13 BWG	10	7,200	53,700	1.644	0.144	Leak around vent weld.
3	2 OD x 11 BWG	14	7,450	58,200	2.068	0.068	Started in weld, torn into adjacent metal.
4	2 OD x 13 BWG	10	5,200	50,100	2.146	0.146	½ in. from weld.
5	2 OD x 13 BWG	10	6,000	57,800	2.145	0.145	⅝ in. from weld.
6	3 OD x 12 BWG	10	3,800	50,500	3.286	0.286	⅝ in. from weld.
7	3 OD x 12 BWG	10	4,900	61,400	3.260	0.260	½ in. from weld.
8	3 OD x 12 BWG	10	4,200	55,200	3.263	0.263	½ in. from weld.
9	4 OD x 10 BWG	10	3,750	53,200	4.359	0.359	Pin hole leak in weld after pipe had expanded approx. ¼ in. in dia.
10	4 OD x 10 BWG	10	3,800	54,000	4.469	0.469	¼ in. from weld.

* The fiber stress values were obtained by using Barlow's formula and the actual O. D. and actual wall thickness of the specimens.

The outside burr or extrusion resulting from the welding operation is removed by a cutting tool as the tube leaves the welding machine and the inside burr is forced down while the metal is still hot. The tube as it comes from the welder will stand up under all the routine tests used in the factory as well as the tests included in the boiler tube specifications, without failure at the weld. Periodic samples are roller-expanded with the standard tool used for expanding tube into tube sheets and the tube is then flanged. Specimens for tests are taken while the tube is being welded, and the tests made immediately. If there is any indication of failure in the weld, the tube is rejected and no further tube is produced until an adjustment is made in the machine and a good weld obtained.

Electrically Welded Tubes Normalized

One would assume that a tube of this caliber should be acceptable for boiler tube, but it was felt that this was not the best product which could be produced for several reasons. The microstructure at the weld, although very slightly different from the parent or base metal, as proved by the physical characteristics of the tube and its appearance under the microscope, nevertheless is different. Also, the entire tube has been hardened to a more or less degree in the forming and sizing operations, the sizing being done in a set of rolls through which the tube is passed after it leaves the welder. Consequently the tube cannot be considered as of uniform temper around its entire circumference.

To eliminate all variables or differences in the steel, only one operation could be relied upon, namely, a true normalizing above the upper critical temperature (1650 deg. F. for standard boiler tube analysis); and all electric resistance welded boiler tube is therefore now normalized. As a result the finished product is uniform in all respects. It is virtually impossible to locate the weld in Fig. 3, which is a photomicrograph at 100 diameters of the weld zone of a tube welded by the Johnston process and then normalized. If it were not for the presence on the tube of the burr, there would be no means of locating the point where the weld had originally been made. The normalizing operation has resulted in complete recrystallization, and since the welding operation itself results in merging of the crystals across what was originally the joint, there is no line or other indication of a weld. Actually it is the equivalent of a weldless tube.

After normalizing, the tube is pickled to insure a scale-free surface, straightened, cut to length and given a hydrostatic test at a pressure above that required by the specifications. The finished tube is again tested in accordance with the specifications for flanging, flattening, crushing, etc.,

just as it was when it came from the welding machine.

Acceptance of Electrical Product for Boilers

The boiler code committee of the American Society of Mechanical Engineers in case 709 (revised) has recommended that electric resistance welded tubing be accepted provided it meets the specifications, S-17, and provided the tube is normalized. Close to a million feet of the tubing have already been installed in boilers on this basis, with not one failure in service reported to date, and today electric resistance welded boiler tubes are considered a standard classification in the construction of boilers. At the present time there are no specifications covering these tubes except for the ruling of the boiler code committee, but the American Society for Testing Materials has under consideration a revision in the existing specification to include this class of product. Both the American Bureau of Shipping and the United States Steamboat Inspection Service have also approved this tubing, and all boiler insurance companies have signified their intention of accepting electric resistance welded boiler tubes as a standard product.

In addition to conforming to the standard specification, electric resistance welded boiler tubes have certain characteristics which have proved advantageous in making installation easier and in prolonging the life of the tubes after they have been installed in service. The tubing is concentric, since it is made from strip steel, which as a rule does not have more than 0.003 in. variation in thickness at any cross-section. It is uniform in all respects, namely, hardness, tensile strength, ductility, microstructure. It is very ductile and yet tough, all of the above making for ease and rapidity in installation, and to some degree adding to the corrosion resistance of the tube.

TABLE II—Transverse Tensile Tests of Tube Material

Tube No.	Tube Size Original, in. OD	WT	Test Size, in.	Yield Point lb./sq. in.	Ultimate lb./sq. in.	Per Cent Elong. 2 in.	Rockwell B Hardness
2	2	x 0.140	0.755 x 0.140	39,300	50,900	21.0	65
2	2	x 0.140	0.755 x 0.140	38,900	50,900	21.0	65
*2N	2	x 0.140	0.755 x 0.140	32,600	48,000	23.0	60
3	2	x 0.100	0.755 x 0.100	41,000	54,300	28.0	67
3	2	x 0.100	0.755 x 0.100	41,000	54,700	27.0	65
*3N	2	x 0.100	0.755 x 0.100	38,400	56,900	28.0	63
4	2-½	x 0.130	0.755 x 0.130	37,200	50,900	30.0	60
4	2-½	x 0.130	0.755 x 0.130	37,700	50,900	30.0	61
*4N	2-½	x 0.130	0.755 x 0.130	32,600	48,900	34.0	60
5	3	x 0.113	0.755 x 0.115	36,900	51,300	33.0	60
5	3	x 0.113	0.755 x 0.115	36,900	51,400	33.0	60
*5N	3	x 0.113	0.755 x 0.115	33,100	48,400	39.0	59
6	3	x 0.195	0.755 x 0.195	41,400	52,300	28.0	68
6	3	x 0.195	0.755 x 0.195	41,100	52,600	27.0	70
*6N	3	x 0.195	0.755 x 0.195	32,600	49,200	38.0	50
7	3-½	x 0.125	0.755 x 0.128	34,100	49,700	31.0	63
7	3-½	x 0.125	0.755 x 0.128	34,100	49,900	31.0	58
*7N	3-½	x 0.125	0.755 x 0.128	34,400	47,600	38.0	58
8	4	x 0.140	0.755 x 0.140	37,800	53,000	33.0	61
8	4	x 0.140	0.755 x 0.140	37,400	53,000	33.0	61
*8N	4	x 0.140	0.755 x 0.140	36,400	50,100	35.0	60

* All tests marked "N" were normalized at 1700 deg. F. before testing. They showed slightly better elongation and lower tensile.

The accompanying photograph shows the location of the weld with reference to the point of failure. The specimens shown are characteristic of all tests made.

Probably the most important factor in resistance to corrosion is uniformity and smoothness of surface—and this is one of the outstanding attributes of this class of tubing. The strip steel, being a rolled product, has a smooth surface to begin with, which is further improved by the operations on the tube, which impart practically a cold rolled finish to the tube. The surface is also dense because clean steel is used in the manufacture of the tube and the rolling further increases its density. The tube is scale-free and does not have any defects where accelerated corrosion may take place.

The physical properties of electric resistance welded tubing, which is used for mechanical purposes, are amply covered in bulletin No. 161 issued by the Bureau of Standards. The properties of electric resistance welded boiler tubing are here listed:

Elastic limit,
30,000 lb. per sq. in. minimum
Ultimate strength,
45,000 lb. per sq. in. minimum
Elongation in 2 in.,
45 per cent minimum
Rockwell B,
65 maximum

Because of the fact that the tube as a rule will be used in long lengths in boiler construction, it was deemed advisable to run bursting tests on boiler tubing in lengths comparable with those used in actual service. The results of a few of these tests are also tabulated. Through oversight only one test has been made to date on the 2-in. outside diameter, No. 11 gage tube.

As proved by the tests, location of

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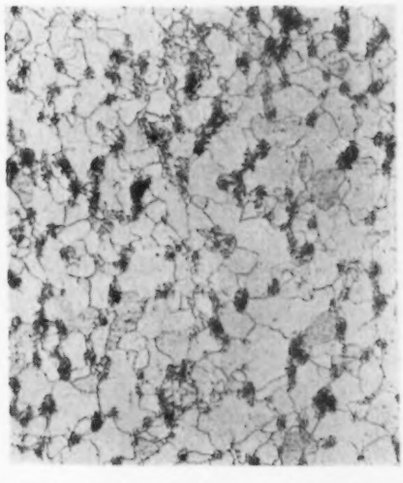


FIG. 1—Microstructure in the welding zone, at 100 diameters, of a tube received directly from the welding machine.

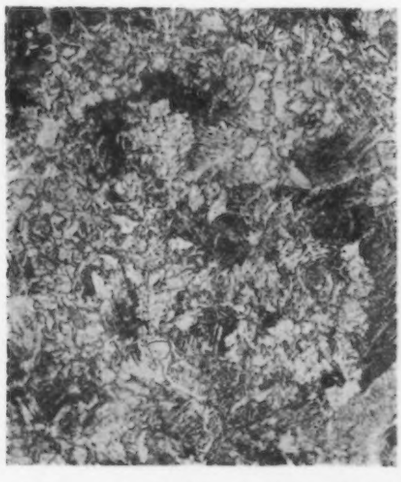


FIG. 2—Overheated structure, at 100 diameters, of a stationary butt weld of two pieces of flat steel.

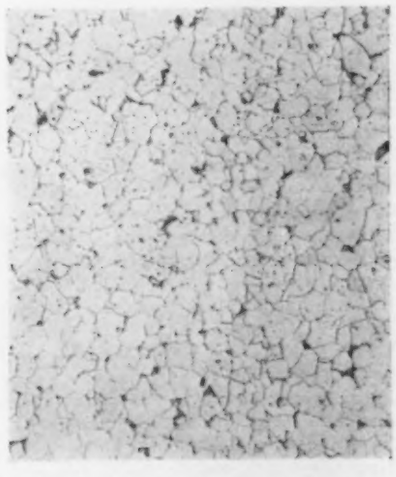
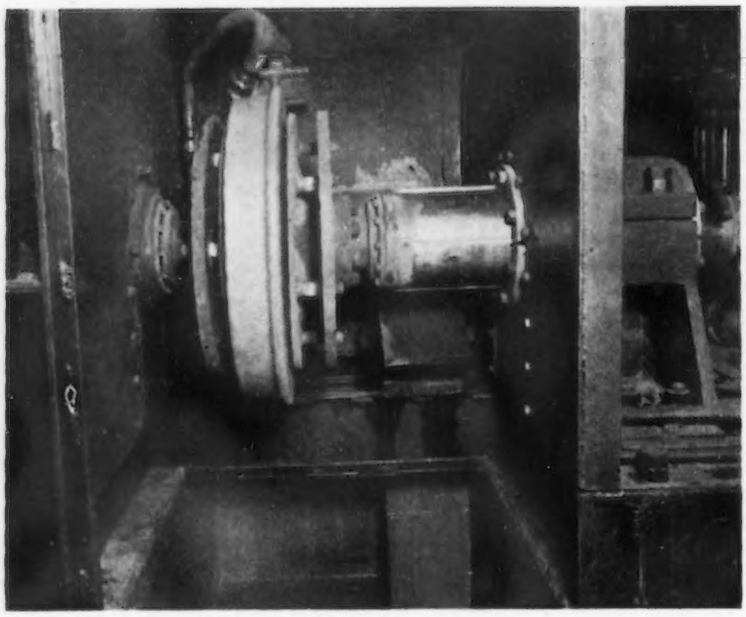


FIG. 3—Microstructure, at 100 diameters, of a tube welded by the Johnston process and then normalized.

Precision Control Features Heat Treating of Wrought Steel Wheels



IN quenching, the wheel is clamped between two rotating disks and while rotating water is sprayed on the rim, with the web and hub of the wheel protected.

AUTOMATIC, precision control methods are an outstanding feature of a recently completed unit designed for the heat treatment of wrought steel wheels at Bethlehem Steel Co.'s Johnstown wheel plant. These, combined with a carefully synchronized layout and latest types of equipment, have proved it possible to consistently obtain unusually uniform results. At the same time the handling of large runs is speeded up and simplified.

The new heat-treatment unit forms an integral part of the wheel plant. It is so located that wheels which are to be treated can be diverted through it with a minimum amount of travel and disruption of ordinary routine movement.

Three major operations are involved in obtaining the desired results, namely, heating, quenching by a distinctive method, and drawing. Special equipment, almost entirely automatically controlled, has been installed for these operations, thereby to eliminate errors due to human fallibility.

A circular, continuous heating furnace with rotating hearth; a floor type charging and withdrawing machine; two motor-driven quenching units; a drawing furnace similar in type to that used for heating; cooling pits; and various auxiliary equipment, such as fuel tanks and pumps, time clocks, and control boards, comprise the complete installation. The main operating units form a compact ensemble that eliminates unnecessary handling of material and at the same time provides ample room for convenience.

The charging and withdrawing machine operates on a track which lies between the heating furnace on one side and the quenchers and drawing furnace on the other. At one end of the track is a transfer platform on which wheels for treatment are placed. At the other end is a similar platform on which wheels removed from the drawing furnace are deposited for transfer to the cooling pits which lie beyond.

Wheels are diverted to the heat-treating unit after what is known as the first or hot bed inspection. In the process of manufacture the wheels, after being forged, rolled and dished to the required shape, are placed on a hot bed where they are allowed to cool down slowly to room temperature. They are then given a thorough first inspection which includes a check-up of general condition, taking of tape measurement, etc. Wheels that call for no treatment go direct to the machine shop from here. Those that are to be treated are carried by an overhead crane to the transfer platform at the heat-treating unit.

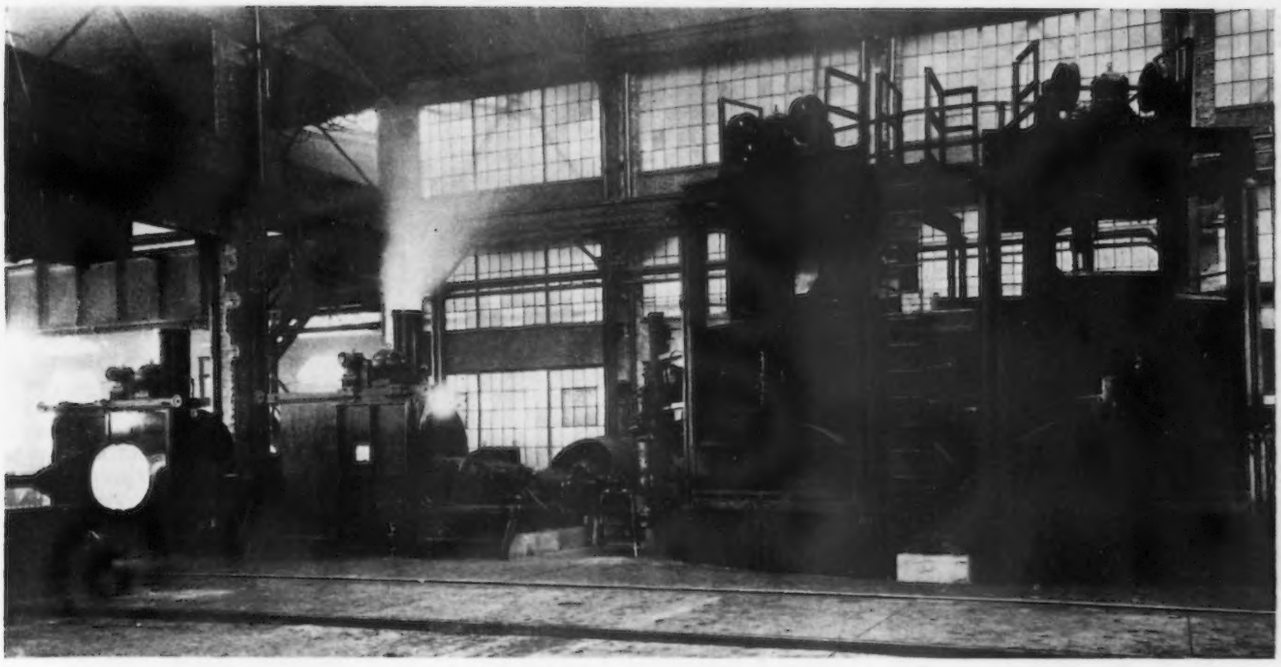
All movements of the wheels incidental to the necessary shifts of location in the course of the heat-treating operations proper are made with the aid of the one charging and withdrawing machine which serves both furnaces and quenchers. This machine was specially designed for the installation described. In general it is similar to conventional equipment of this character designed for a high degree of flexibility in operation. Special modifications have been made however. These include the provision of self-contained compressed air equipment for actuating the gripping jaws and the installation of special controls which enable the operator to control the opening of furnace and quencher doors. There are nine operating controls, one of which is worked in four positions, and another in two.

The first step in the heat-treating process is to place the wheels in the heating furnace, where they are gradually heated to a specified temperature, which is maintained constant for a specified length of time. The time and the temperature are determined by the metallurgical department and are governed by the shape and section of the wheels being treated.

Rotary Hearth Heating Furnace

The heating furnace is circular in shape and is known as the rotary hearth type of furnace. It has an outside diameter over the brickwork of 43 ft. 5 in.; the annular hearth is 7 ft. 3 in. wide with a mean diameter of 32 ft. and capacity of 54 36-in. diameter passenger car type wheels. A motor drive, placed in the circular space of the center of the furnace and reached by stairs leading under the furnace, rotates the hearth through reduction gears and a rack and pinion drive. The rack is attached to the lower side of the hearth. The hearth is supported on stationary rollers and is held concentric with the furnace by means of roller guides. Two doors are provided, one for charging and the other for discharging.

The furnace is divided into four heating zones, each controlled by a potentiometer. In the first zone, into which the cold wheels are placed, the wheel temperature is gradually increased from room temperature to about 1200 deg. F. In the second zone the temperature of the wheel reaches



At the left may be seen the quenching machines and at the right, operated similarly to the heating furnace, is one of the drawing furnaces.

1400 deg. F. while in the third and fourth zones a constant temperature of about 1600 deg. is maintained. A baffle wall in the furnace between the charging and discharging doors separates the first and fourth heating zones and maintains the difference in temperature which exists at these points. Sand seals are provided at the outer and inner circumferences of the hearth. Refractory blocks, built into the hearth and staggered, allow free circulation around the wheels and form a bed for the wheels while being heated.

Oil fuel is used and is supplied from an independent fuel storage and pumping unit automatically controlled for temperature and pressure.

The most important thing to stress in connection with this furnace as well as other equipment to be described is the absence of manual control. The human element is almost entirely eliminated. Potentiometers control the temperature of the heating zones. Fuel temperatures and pressures, as mentioned above, are controlled automatically. The time

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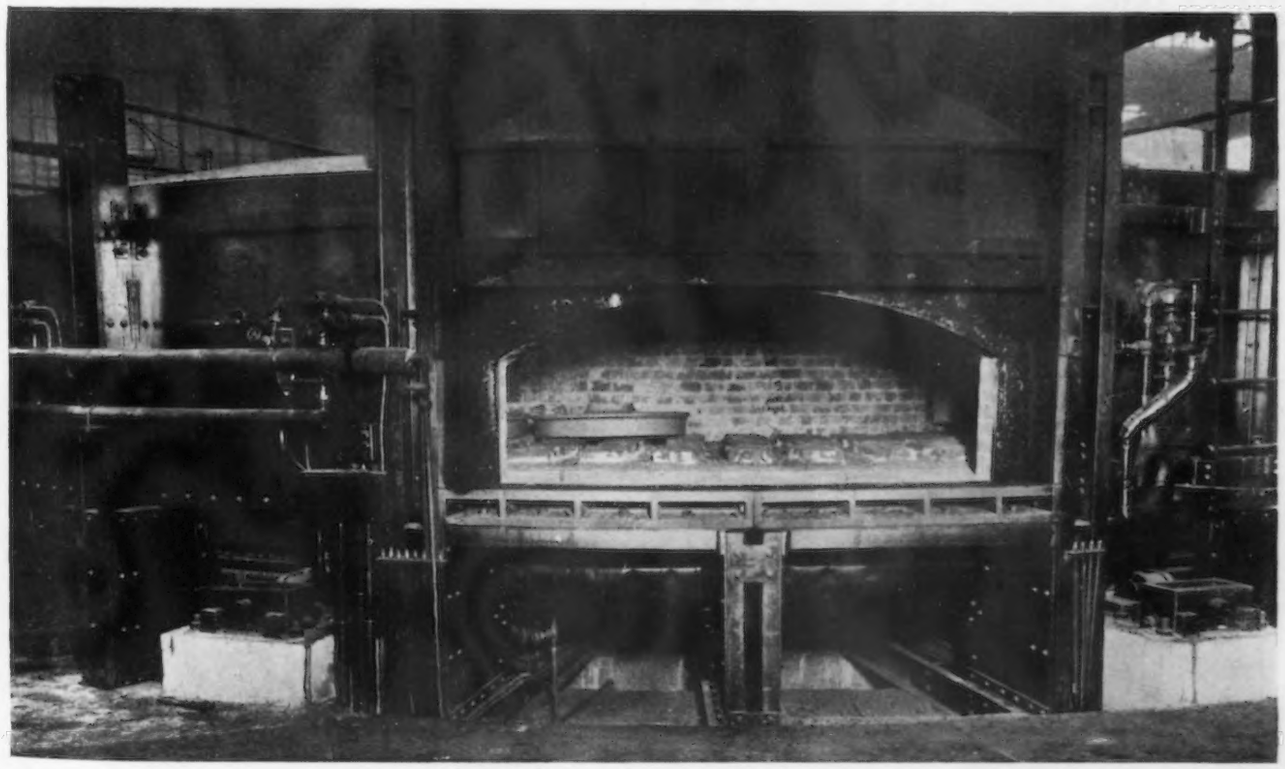
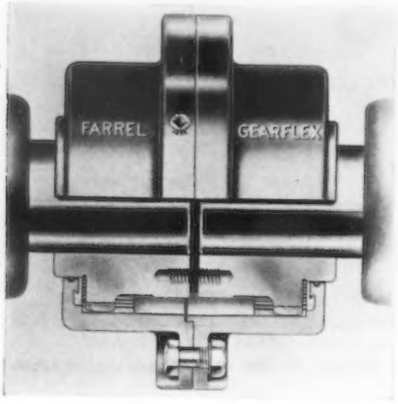


The heating furnace has a rotary hearth capable of holding 54 wheels of 36 in. diameter. Temperatures and pressures are controlled automatically and rotation is governed by an automatic time clock.

Introduces New Gear-Type Flexible Couplings

GEAR-TYPE flexible couplings designated as the Farrel Gearflex are being made by the Farrel-Birmingham Co., Buffalo, N. Y., in both double and single engagement varieties.

The double-engagement Gearflex consists of two externally geared hubs keyed to the two shafts to be connected and engaging an internally geared floating sleeve which engages the two hubs. With two sets of spur gears, one at each end of the floating sleeve, misalinement is compensated for by the sleeve assuming a neutral position between the two shafts. Thus, it is stated, all whip or crank action is eliminated, and the bearings and shafts are relieved of heavy pressures or vibration. Accurately generated gears, cut on Sykes machines, assure distribution of the load over a large number of contact surfaces.



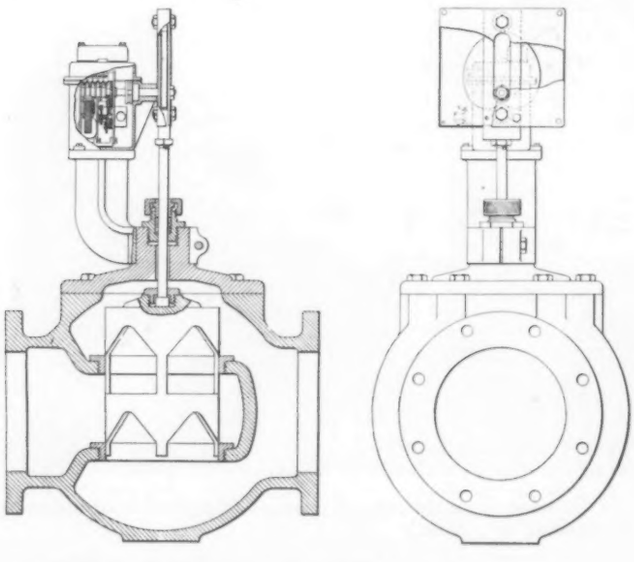
Lubricant is carried in the large reservoir between the hubs and the floating sleeve. When the coupling rotates, the centrifugal force throws the oil to the inner surface of the floating sleeve, from which it spreads to the gear teeth, entirely immersing the load-carrying surfaces in a bath of oil. The oil film with its cushioning effect is said to give quiet operation and reduce wear to a minimum.

In the single engagement Gearflex there is only one externally geared hub in engagement with an internal gear in the sleeve, the other hub being solid and the sleeve bolted to it. This type is for applications where the high-speed capacity and the high degree of flexibility of the double engagement Gearflex are not required. Both types are available in a number of standard sizes and power ratings.

Makes 12-In. Motor-Operated Valve

THE Barber-Colman Co., Rockford, Ill., has added to its electric system of temperature and humidity control a number of motor-operated valves in sizes larger than 2 in. By means of these, electrically-driven valves suitable for remote automatic or manual control can be supplied for many services.

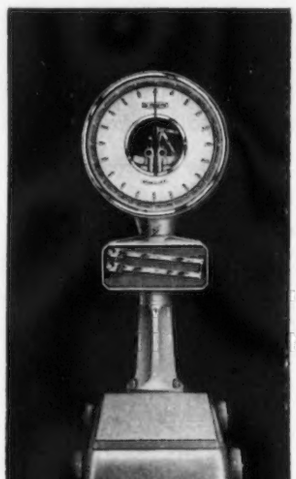
There are three general types of these valves. The single-seat type with renewable composition disk, made in sizes from 2 in. to 6 in., will handle pressures from 80 lb. to 90 lb. depending upon the size, and is available with either positive or reversing motor-operators. The semi-balanced double bronze disk type is made with vee-port disk in 2 to 4-in. sizes and with standard disk in the 5, 6 and 8-in. sizes, either positive or reversing for 125 lb. pressure. The largest one, the full-balanced vee-ported piston disk type, is made in sizes from 5 to 12 in. with reversing operators only, and for pressures up to 125 lb.



BARBER-COLMAN motor - operated valve with reversing operator. This type is made in 5 to 12-in. sizes.

Develops New Portable Platform Scale

THE Kron Co., Bridgeport, Conn., is announcing a new portable platform scale, the platform of which is 21 by 29 in. and is designed so that the platform-plate does not overhang the suspension loops. This permits maximum loads to be placed on the very edges of the platform without disturbing the accuracy of the scale. Another feature emphasized is that the platform levers have no lateral movement.



These portable scales are built with four wheels, which are made of a combination of Bakelite and rubber. If desired, however, a three-wheel construction can be furnished and the scale fitted with a handle to facilitate moving it about the plant. The company's standard improved ball-bearing one cam translation mechanism is regular equipment.

THE all-purpose Oxweld aluminum welding flux being announced by the Linde Air Products Co., 30 East Forty-second Street, New York, is intended to replace the two fluxes previously marketed, one for welding pure aluminum and the other for welding aluminum alloys.

It is stated that in addition to doing what a few months ago required two separate fluxes to do, the new material is a better aluminum flux, saving time and improving the quality of the work.

Automatic Annealer for Spot Heating Steel Parts

AN automatic gas-fired annealing machine for spot heating steel and other parts up to 2 ft. in diameter has been placed on the market by the Selas Co., Eighteenth Street and Indiana Avenue, Philadelphia.

The machine is a self-contained power-driven unit carrying eight adjustable burners supplied with gas premixed with air. The mixture produced by the Selas gas mixing machine is delivered at an orifice pressure of 3 lb. Each burner consumes gas at the rate of 100 cu. ft. per hr. while heating the work, but is throttled to about 15 cu. ft. per hr. during the loading periods. Individual adjustments of the burners and locating fixtures are provided, and this permits placing the burners in any desired position with relation to the piece being heated. Each burner is equipped with a manually-operated shut-off cock in addition to the automatic throttling valves which control the heating cycle. Insulating refractory baffles reflect the heat down upon the work, accelerating the rate of heating and localizing the heated areas.

Work is fed into the machine by the operator and is delivered at the rate of 6 pieces per min. The machine rotates continuously from left to right, the burners being turned on and throttled down, and the baffles moved in and out of the operating position automatically. The drive is by a small geared motor direct-connected and flexible coupling. The machine has a wide range of adjustment and can be readily adapted to handling either flat or formed pieces.

Advantages claimed over previous heating methods include reduction in labor, increased production, substantial saving in fuel costs, and controlled and uniform heating. With but slight adjustments, the burners will operate on any commercial gas fuel.

Builds Six-Way Drill For Use on Crankshafts

THE National Automatic Tool Co., Richmond, Ind., recently completed the special six-head hydraulic-feed drilling machine here illustrated, for drilling the oil holes in the forged steel crankshaft of a prominent make of automobile. Operation is semi-automatic, and all heads are controlled completely by means of a single foot treadle.

Each unit is equipped with a single spindle arranged with nose adjustment. A special valve and trip mechanism permits automatic variation of drilling depths, making possible the step drilling of the deep holes in the crankshaft. This feature permits the relieving of chips and the cooling of the drills during the drilling operations. In addition to longer drill life, a cleaner hole is said to be obtained.

The fixture, of four-position trunnion type, is arranged to hold one crankshaft in each position. The base is of welded construction and forms a reservoir for the hydraulic and coolant systems. Production is approximately 25 crankshafts per hour with this machine. The weight of the machine is about 17,000 lb.

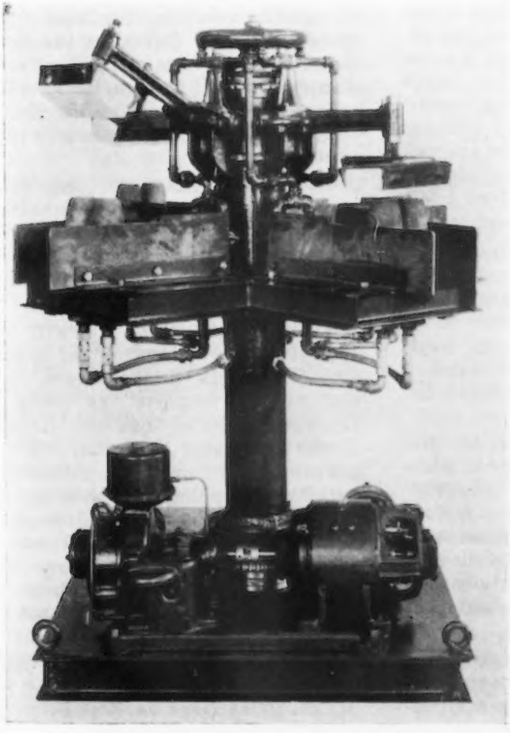
20,400 Gal. Per Hr. Pump Is Self-Priming

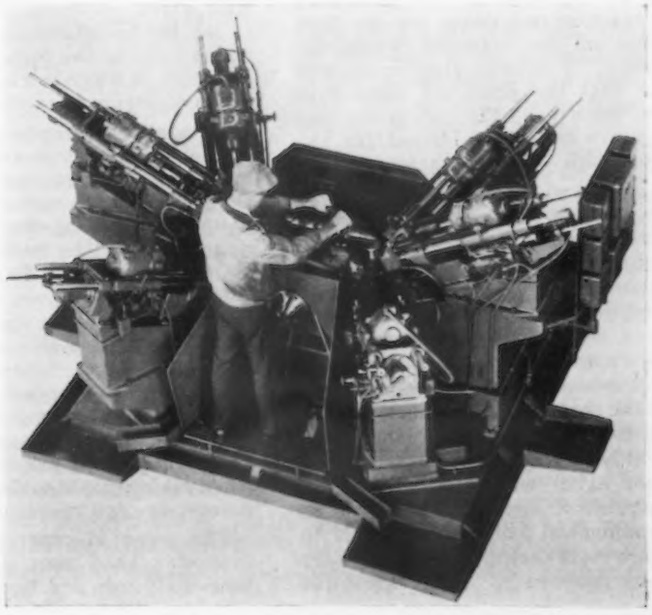
THE Chain Belt Co., Milwaukee, announces a new 3-in. self-priming centrifugal pump, which rounds out its line of Rex speed primers. It is of the recirculating type and is automatic in action after the recirculating system is once filled.

The unit has been developed to provide a pump close to the same light weight portability of the 2-in. class, but with increased capacity. The unit weighs 385 lb., it is 34 in. high and 37 in. wide, and it is capable of the following capacities: 5 ft. suction lift, 20,400 gal. per hr.; 10 ft., 18,300 gal.; 15 ft., 16,500 gal.; 20 ft., 14,000 gal., and 25 ft., 9000 gal.

The impeller is of the open trash type with two blades instead of the customary four. The pump accordingly is capable of handling a high percentage of solids. The power is supplied to the unit by a compact air cooled engine which develops 6 hp.

The pump and engine are mounted on a wheel barrow frame to provide the utmost portability, and both the pump and power unit may be removed from the frame by loosening four bolts. A ring on the top of the pump permits it to be lowered into a hole with the block and tackle, in cases where the depth of the hole exceeds the suction lift of the pump. An electric motor-driven speed primer can be furnished.





THE automatic gas-fired annealing machine shown at left spot heats parts up to 2 ft. in diameter. In drilling oil holes, the six-way hydraulic-feed machine pictured below produces at the rate of 25 crankshafts an hour.

... LETTERS TO THE EDITOR ...

Cast Iron in Machine Tools

Editor, The Iron Age:

I KNOW that all concerned will commend you on your editorial in the March 16 issue on "Fits Sales Talk to Customer's Environment." Drawing my information from comments which I have heard recently from foundrymen connected with the machine tool industry, I know that they will appreciate your interpretation of the equipment user who chooses the uncertain road which is "ideal for developing body squeaks and rattles."

Gray iron founders are fitting their sales talk to their customers' environment by calling their attention to the fact that the vibration-absorption quality of gray iron excels that of all other engineering materials. This is something which is independent of the mass of the structure and is due to the greater internal friction of the grains in cast iron. This property is also associated with the superior fatigue resistance of gray iron which has been given the name "crackless plasticity," by Professor Moore of the University of Illinois.

Engineers are also being encouraged to choose a proper A.S.T.M. classification of gray iron and base their design on the strength indicated and a proper distribution of mass in the structure. It is regrettable that a talk by J. E. Padgett before the Society of Automotive Engineers, as reported on page 240 of your Feb. 9 issue, advises the automobile industry to "get away from its present cast-iron type of design." Such statements are always harmful because they are so obscure. He intimates that machine tool prices are too high because of the excessive weight of castings. I believe that most will agree that the price per piece that foundrymen have charged in the last few years cannot be blamed for the alleged high price of machine tools.

I can see where unnecessary weight in any design will affect the cost of a machine, particularly as regards freight rates. Modern gray iron can be subject to redesign on this basis *provided the engineer is convinced that certain masses are unnecessary.* If Mr. Padgett regards the smooth curves connecting supporting members and the base of a machine tool as "cast-iron type of design" and therefore superfluous, I am afraid that we cannot agree with him. From the standpoint of appearance, as well as the mechanical point of view, wide fillets are more desirable than the sharp corners common to other fabricated structures. I am sure that the good service which castings have given to the machine tool industry in the past is largely dependent on the rigidity and freedom from stress concentrations which the former design insures.

Coming to an opinion which the automobile industry respects—I refer to Arnold Lenz of the Chevrolet Motor Co.—a statement made in your publication a year and a half ago can be cited to the effect that cast iron will always be used where weight, rigidity and vibration-absorption quality are necessary. He also stated specifically that all conveyors today are built too light. I do not believe that members of the automobile industry would be willing to allow the construction of their machine tools to trend in this direction in view of this fact.

W. WORLEY KERLIN,
Metallurgist, Technical Department, Gray Iron Institute.
Cleveland.

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Costly Efficiency

Editor, The Iron Age:

THE article "Synthetic Time Setting in a Jobbing Foundry" in the April 27 issue was of the keenest interest to me.

The reason for my interest lies in the fact that several years ago, as newly appointed superintendent of a steel foundry, I had the doubtful pleasure to work under a similar system as described in your article, with the difference that it was applied to almost every department of the foundry.

When I took charge, the time study and setting of standard rates was almost completed, so that, when it came down to put the new rates into effect I was, as you might say, confronted with a *fait accompli.* I had nothing to say but to enforce the new system, which I did to the best of my ability. However, it was not long before I felt the percussions from right and left.

With all due respect to the author of the article and presuming that the system is working satisfactorily at the Link-Belt Co., unfortunately it did not work at all at the foundry mentioned above (the name of which I am not at liberty to divulge here) for several reasons.

One of the first reasons for the failure was the overbearing attitude of the so-called "efficiency experts" toward the shop organization, including the men. A mutual distrust with frequent personal insults followed, which did not help the time study men when taking the time for the different movements and operations.

The corps of experts consisted at first of a head man, assistant, four time-study men and two men computing the data furnished by the time study men. Might add that this work was done by an outside concern on a contract basis and has cost the concern owning the foundry an enormous sum of money, for which these experts have managed to build up a system so complicated that finally nobody knew what it was all about.

A Nice Long Job

It took one and a half years for these eight men to set standards up on most of the production and part of the jobbing work. Just then it happened—and this system was greatly responsible for it—that the steel foundry came under new management and, among one of his first acts, the new manager threw the whole system overboard.

One of the peculiarities of the system was that all figures appeared in units, when steel castings are made and sold by pounds and tons.

Now the aim of the whole system was to get, all over the plant, standardized rates, based on minimum wage scales for each class of skilled labor. Jobs requiring helpers were figured on a 60-40 basis. For the benefit of the shop executive staff, a department budget system was set up with provisions of monthly bonuses, provided that the budget set for the month was bettered.

A Bonus that Couldn't be Earned

This budget plan was set up on a basis of 600 tons of steel castings per month (the only instance where "tons" appeared) and here is how it worked out: The first month we were operating under this budget plan we produced 700 tons; everything went smoothly during the month and everybody was congratulating everybody else on the substantial bonus we were to receive as soon as official figures were available. But when the figures did come out, one can imagine the disappointment, for practically all figures were in the red, despite the fact that the foundry had made a profit that month.

The direct reason for this failure was that time studies were taken in each department under almost ideal conditions and everybody knows that such conditions are rare and far between.

To illustrate this, we will take, say, six 8-in. fittings out of a lot of 24. These six fittings were picked out by the "experts" as being fair representatives of that lot. However, I was told later that they were the very best ones and took minimum of grinding, chipping and welding. The standard for these 8-in. fittings was now established at, say, 10 min. for the three operations. Two weeks later an identical lot of these 8-in. fittings would come through, but they had some fins at the coreprint and some on the parting line and required more grinding and chipping this time,

(*Concluded on Page* 54)

What Industry Thinks of Industrial Control

"To Tell the Truth About 'Inflation ad Infinitum,'" says M. C. Rorty, "Is Like Telling a Child There Is No Santa Claus"

By M. C. RORTY
Past President, American Statistical Assn.,
Formerly Vice-President, I. T. and T., etc.

M. C. RORTY

IT is quite impolitic to mention it. If one does, he immediately becomes "suspect" and an enemy of the people or worse. To tell the truth on the subject is like telling a child there is no Santa Claus. For this reason the verities as to this particular forbidden question are only whispered in the circles of those who know. The rumor went around, not long ago, that one very eminent European economist had actually printed his thoughts on the matter—but a search of his published statements showed that he, like others, had only whispered the truth.

What is this truth, of which the mention is so rigorously tabooed? Briefly stated, it is simply that the whole concept of arbitrary wage fixing by legislative fiat or by collective bargaining, of minimum wages, and of fixing the compensation of labor by legislative fiat, is almost wholly fallacious in practice, as it is equally fallacious in theory. Furthermore, when such wage-fixing is attempted on a large scale, the inevitable result is either a series of economic deadlocks and of liquidations by crises, or the sinking of economic activities into a semi-chronic stagnation palliated by doles and the like, or, more probably, in the present spirit of the times, an indefinite series of currency devalorizations.

The time has surely come to look our economic Santa Claus in the eye and to accept the fact that he is simply another wish-thought parading in false whiskers. Of course, we can all become millionaires by government mandate if we wish, and if we do not care what our dollars are really worth. But otherwise we shall only rob Peter Consumer to pay various favored Pauls among our working population. As a matter of fact, we shall rob Peter without even paying Paul, for the very certain effect of the fixing of economically unjustified wage scales in particular occupations is to attach to such occupations an excess of workers subject to chronic part-time employment.

The basic facts are entirely clear to anyone who will take a minimum of trouble to study them, and who is not psychologically or psychopathically unable to accept the truth. The real money invested in manufacturing and other corporation equities earns, in the long run, not more than the bare equivalent of ordinary interest. The corporation income tax returns after allowance for intercorporate duplications show that the total of corporation dividends averages, year in and year out, less than six per cent of the national income. Such long-term average includes the full effect of plowed-in surpluses. Here and there an especially successful corporation may, for a time, make substantial earnings in excess of interest on its real investment—but the "new era" illusion of widespread earnings of this sort is now thoroughly exploded. Readily available statistics, confirmed by the studies of many investigators, are sufficient to show that the earnings on real corporation equities do not average more than seven per cent. But these studies and statistics admittedly fail to make full allowance for periods of absent or reduced dividends, or for those major losses, as in the street railway systems, which periodically wipe out not only dividends, but major fractions of principal.

The problem of determining the actual average of earnings on corporation equities, after allowance for all losses, is one of great difficulty. The privately expressed opinions of those who have studied the question for years range from the belief that such earnings are about equal to, but do not exceed, a normal interest rate (say six per cent), down to estimates of net earnings as low as three or four per cent. The consensus of opinion among such investigators is, however, very definite to the effect that, whatever the earnings of corporations may be, the average is no more than is required to maintain the flow of new investment necessary for our economic growth and progress. Even with allowances for scattered monopoly profits, which surely do not exceed one per cent of the national income, there are very certainly even in normal times, no important margins of corporation earnings which can be diverted to wage payments.

SUPPLEMENTING this absence of excessive profit margins, there is every evidence that each crisis wipes out very promptly any accrued operating inefficiencies of the prior boom period. Such accumulations of wastes amount, apparently, to about five per cent of operating costs. Our gains in productive efficiency and in real wages move, therefore by jumps, with sudden gains of about five per cent, in periods of depression, forming part of long-term gains which average between one and two per cent per annum. Wastes in useless styles, in advertising, in distribution and merchandising, and in various legalized and illegal rackets and restrictions on productive efficiency are serious—but none of these can be affected by mandatory increases in wage rates. Such increases can, in the long run, operate only to increase costs to consumers. The primary productive processes are the most efficient elements

in our economic system. Their efficiency cannot be forced, but will respond almost automatically to favoring conditions of stabilized mass demand and to a reasonable freedom from legislative interference, other than that required to prevent monopoly abuses.

When the preceding facts are once realized, it becomes clear that, whether we like it or not, average real wages are, and must be, subject to the laws of supply and demand. Labor may not be a commodity, but no fervent wishes or legislative fiats can prevent the rewards of labor from continuing to be a substantially fixed and only slowly changing fraction of commodity prices — nor can forced wage increases stimulate producers to sudden increases in efficiency which the threat of the sheriff has been unable to bring about.

All the preceding considerations bring us face to face with the major and most dangerous of our present-day economic dilemmas. Can our democracy be trusted to accept the real facts—to realize the essential fallacies which lie in the theory of forced wage-fixing to establish assumed standards of living, either by collective bargaining or by legislative fiat —or must we accept a wasteful piling up of one artificiality upon another? Shall we let wages be fixed not by the basic value of productive effort, but by the struggles of opposing interests, and by the loose figuring of theorists who not only deny, but refuse to look at, the realities? Shall we raise prices not to the pre-depression scale, but to much higher levels? And shall we then raise prices and wages again, because costs of living have risen?

Finally, shall we bolster up this false series of price and wage structures by means of a similar false series of protective tariffs and of debasements in the value of our monetary standard?

These are the questions which are being asked privately and with increasing frequency, not in reactionary circles, but among those whose knowledge and whose constructive and human-minded attitude is beyond question. It is as certain as gravitation that our theoretical wage boosters will be no more modest in their demands than have been our veterans for bonuses and pensions. Must we match the lunacies of the "new era" with equal lunacies of the "new deal"?

It may be correct to argue that the new administration at Washington has been wholly sound in seeking to check wage and price deflation, and to restore in some measure the pre-depression levels. There may be an emergency need, in particular, to check the extremes of wage cutting. The intent has been good, but in the process of doing the necessary things we have opened a Pandora's box of economic fallacies, which may plague us for a generation.

We may muddle through to the adoption of a patchwork economic ox-cart of a semi-socialistic economic system—because we have not the collective intelligence to clean the spark plugs and gasoline feed of the automobile of our progress; we may run ourselves into a new crisis; or, more probably still, we may find that the processes of arbitrary wage-fixing will raise prices so far as to force a devalorization, or perhaps successive devalorizations, of the dollar to a level far below the 70-cent point that has been contemplated.

If none of these things are to happen, no time must be lost in a rigid insistence that prices shall be held to no more than pre-depression levels, and wage costs to their normal and inevitable relations to such prices. The emergency is here. Shall we sacrifice our insurance policies, our savings deposits, and the thrift of the majority of our population to false theories and the special interests of industrial workers?

It is only fair to state that the staff of the National Recovery Administration is aware of these dangers and is endeavoring to guard against them. But in a pervading atmosphere of economic fallacies, can even the whole power of the Federal Government, beset as it is by unreasoning political pressure, hold the balance evenly between a sound recovery and the chaos of uncontrolled inflation ad infinitum?

OBITUARY

JOHN H. WATERS, president of the National Radiator Corpn., died of cerebral hemorrhage at the Emergency Hospital, Washington, on Aug. 14, aged 74 years. He was one of the organizers of the Fowler Radiator & Mfg. Co., Norristown, Pa., which he purchased in 1896. The name was changed in 1902 to the National Radiator Co. In 1918 the National company acquired the Federal Radiator Co. and in 1927 these plants and five others were merged into the present National Radiator Corpn., with Mr. Waters as head. Mr. Waters was also president of the Century Stove Mfg. Co.

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J. HOWARD MUZZY, chairman of the board of the Federal Mogul Corpn., Detroit, manufacturer of bearings, died at his home on Aug. 9. A native of Michigan, he entered the mill supply business in Detroit in 1882 and in 1898, with Edward Lyon, formed the Muzzy-Lyon Co., Ltd. When the automobile industry was in its infancy, Mr. Muzzy began production of bearings and bushings, his business expanding rapidly. In 1924 the company merged with the Federal Bearing & Bushing Corpn. as the Federal Mogul Corpn., of which Mr. Muzzy became chairman of the board. He was 68 years of age.

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F. F. WOODS, representative in the Pittsburgh district for Roots-Connersville-Wilbraham, Connersville, Ind., died at his home on Aug. 3, after an illness of several weeks.

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BURTON C. SMITH, LaCrosse, Wis., prominent industrialist and financier, died suddenly at Chicago on July 18, aged 64 years. For many years he was an executive of the LaCrosse Plow Co., later establishing his own farm equipment business as Smith Mfg. Co. He also was a director of numerous other corporations and the Batavian National Bank of LaCrosse.

Local A.S.W.A. Chapter Formed in Ohio

IRON and steel distributers in Northern Ohio organized a local chapter of the American Steel Warehouse Association at a meeting held in Cleveland the past week. About 60 distributers were in attendance. H. B. Ressler, vice-president American Steel Warehouse Association, addressed the meeting and explained how the organization will function in the National Recovery program. Ray Love, Betz-Pierce Co., Cleveland, was elected president and Fred Doran, Joseph T. Ryerson & Son, Inc., was named as secretary to serve for the following year. Chairmen of various committees were named and these later were made vice-presidents. They are: sheet steel, Tom Farrell, Sheet Metal Mfg. Co., Youngstown; cold finished steel, Harry K. Hamilton, Hamilton Steel Co., Cleveland; mechanical tubing, George Parker, Edgar T. Ward & Sons Co., Cleveland; tool steel, F. E. Phelps, Crucible Steel Co.; second sheets, J. D. Finnegan, Hynes Steel Products Co., Youngstown, and hot rolled steel, Robert Leitch, Patterson-Leitch Co., Cleveland.

Asks Bids for Four Vessels

WASHINGTON, Aug. 15.—Sealed bids will be received by the Navy Department for four vessels, the collier *Orion*, the light cruisers *Galveston* and *Denver* and the converted yacht *Niagara*. Bids for the iron will be opened on Aug. 24 and for the three other vessels on Sept. 7.

THE NEWS OF THIS WEEK

British Fear Fuel Rise Will Boost Pig Iron Prices

LONDON, ENGLAND, Aug. 15 *(By Cable)*.—Apprehension on the part of buyers of pig iron that rising fuel costs will be reflected in the price of pig iron is offsetting the dullness of the holiday season by causing considerable inquiry. Home prices remain steady, however, and Cleveland furnaces are shading export quotations to meet competition.

The shipbuilding industry holds more promise for steel but at present British mills are far from fully employed.

Pig iron exports for July were 10,354 tons, of which but 115 tons were shipped to the United States. Total exports of both iron and steel were 156,143 tons. Export of tin plate improved and included 30,000 boxes for Australia. European inquiry is good for prime stock plates and the market has firmed, the maker's price being 17s. to 17s. 3d. basis IC., f.o.b. works port. Dealers are shading this price somewhat.

The Continental steel market is quiet but some business is being done with British merchants. Cartel prices are elastic according to market conditions, resulting in acceptance of five to six shillings gold below official levels for bars, plates and sheets sold to British buyers.

Belgian steel makers are badly off for new business and other cartel members are passing orders to Belgian mills. The German steel industry is reviving and German blast furnaces are now back to 40 per cent of capacity. British and Continental gold prices remain unchanged.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£5	to	£5 7s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	16s. 9d.	to	17s. 3d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hrth.	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£9		
Galvanized sheets, No. 24 gage	£11	to	£11 10s.

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

*Ingots	£2 5s.		
*Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
*Steel bars, merchant	£3		
*Sheet bars	£2 8s.		
Plates, ¼ in. and up	£3 18s.	6d.	
*Plates, ⅛ in. and 5 mm.	£4 1s.		
*Sheets, ⅛ in.	£4 6s.		
*Ship plates	£4 10s.		
*Beams, Thomas	£2 16s.	6d.	
*Angles (basis)	£3		
Hoops and strip steel over 6-in. base	£3 15s.		
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

*Prices as established by European Raw Steel Cartel.

British Iron and Steel Declined in July

LONDON, ENGLAND, Aug. 15 *(By Cable)*. — July registered the third consecutive monthly decline in ingot production in the United Kingdom, total output for the month being 567,500 tons as compared with 568,800 in June and 599,600 in May. In spite of this shrinkage, however, the monthly production still remains higher than that of any month of the preceding year.

British pig iron production also decreased slightly, being 343,900 tons for July compared with 345,600 the previous month. Pig iron also remains at a higher level than the high of 1932 which was 335,600 tons in March of that year.

Monthly totals for 1932 and for the first seven months of this year are shown below:

	Pig Iron	Steel Ingots
1932		
Jan.	332,400	429,700
Feb.	318,100	480,600
March	335,600	462,800
April	316,900	433,300
May	315,300	416,900
June	311,400	459,300
July	292,600	430,300
Aug.	259,400	361,500
Sept.	260,400	430,300
Oct.	275,600	438,500
Nov.	267,700	473,800
Dec.	284,500	430,400
	3,569,900	5,247,400
1933		
Jan.	286,600	444,400
Feb.	270,800	482,700
March	332,200	577,700
April	324,700	513,300
May	339,900	599,600
June	345,600	568,800
July	343,900	567,500

American Exports Gain in 16 Countries

AMERICAN exports for the first six months of this year are better than last year. Six of the 16 countries where gains were recorded, according to a statement just issued by the National Foreign Trade Council, are in Latin America—Argentina, Brazil, Chile, Venezuela, Colombia and Mexico; six are in Europe—Italy, Germany, France, Finland, Spain and Belgium; and four—Australia, New Zealand, South Africa and Egypt—are more or less closely related to the British Empire.

The proportion of manufactured goods among our exports is now more than 67 per cent for the present year compared with 63 per cent for the first half of last year. Among the long list of manufactured articles which are sharing in this decided gain in exports are automobiles, accounting and calculating machines and other office equipment, iron and steel scrap, coal tar products, radio receiving sets and tubes, typesetting machines, power pumps and power driven milling machines. We have exported this year more than $3,000,000 worth of American aircraft, largely to South America, and a greatly increased number of aircraft engines.

Unfilled Orders of Steel Corporation Decline

AFTER showing a consecutive increase for three preceding months, the unfilled orders of the United States Steel Corpn. declined 86,546 tons during July. This compares with the 176,856 ton increase in June, which was the largest monthly gain since early in 1930. In July, 1932, the corporation's backlog was down 68,466 tons, and in July, 1931, it dropped 71,507 tons. July showed sizable increases in unfilled orders during 1930 and 1929, although July, 1928, scored a 53,116 ton decline. The unfilled orders as of July 31, 1933, amounted to 2,020,125 tons, which is slightly larger than the backlog announced last July, but far below July figures for the preceding four years.

The following figures show the Steel Corporation's unfilled tonnage for the end of each month since 1930.

	1933 Tons	1932 Tons	1931 Tons
January	1,898,644	2,648,150	4,132,351
February	1,854,200	2,545,629	3,965,194
March	1,841,002	2,472,413	3,995,330
April	1,864,574	2,326,926	3,897,729
May	1,929,815	2,177,162	3,620,452
June	2,106,671	2,034,768	3,479,323
July	2,020,125	1,966,302	3,407,816
August	.....	1,969,595	3,169,457
September	.....	1,985,090	3,144,833
October	.....	1,997,040	3,119,432
November	.....	1,968,301	2,933,891
December	.....	1,968,140	2,735,353

Sharp July Spurt In Machine Tools

MACHINE tool orders took a sharp spurt during July following substantial gains during the previous two months, according to the monthly report of the National Machine Tool Builders' Association, Cleveland. New orders last month increased to an index rating of 54.7 per cent as against 39.8 per cent in June. Shipments were 37 per cent as compared with 30.9 per cent in June and unfilled orders were 58 per cent as against 40.3 per cent in June.

Secondary Metals Institute Projected

FORMATION of a secondary metals institute has been undertaken by the metals division of the National Association of Waste Materials Dealers. The project is headed by Benjamin Friedman, president of the Metals Refining Co., Hammond, Ind., and chairman of the present division.

The new organization will not interfere with the division's present affiliation with the association. Headquarters will probably be at Chicago. Proposed objectives include improvement of trade relations, economic research in the interest of assisting dealer members and promotion and encouragement of laboratory research and experimentation in the interest of finding still broader uses for metal scrap that already has served a useful purpose.

Non-Ferrous Ingot Backlog

CHICAGO, Aug. 14.—On Aug. 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to a total of 15,657 net tons, according to an announcement of the Institute issued today.

Government to Study Welding

A STUDY of the changes induced in steel by welding and cutting operations is being undertaken jointly by the Commerce Department's Bureau of Standards and the Navy Department's Bureau of Construction and Repair. The study will be conducted, it is pointed out, largely by metallographic methods, and every angle of the problem will be taken into consideration. This study has been begun as a result of the Navy Department's new construction program in which it is planned to make extensive use of welding.

Automotive Congress Program Comprehensive

MORE than 24 technical sessions are included on the program of the International Automotive Engineering Congress, to be held by the Society of Automotive Engineers at the Palmer House, Chicago, Aug. 28-Sept. 4. Social events include the annual dinner on the evening of Aug. 31 and a "Frolic" at the Hotel Sherman on Saturday evening, Sept. 2. Thursday, Aug. 31, is to be S.A.E. day at the Century of Progress Exposition.

At a session devoted to shop equipment, Aug. 28, Joseph Geschelin, engineering editor, *Automotive Industries*, will present a paper on "Industry Needs an Equipment Policy for Profitable Operation." A session on machine finishes, Aug. 29, will include an address on "When Quieter Gears Are Demanded, How Will We Make Them?" by F. W. Cederleaf, and a paper on "External Broaching," by C. E. Bleicher, Chrysler Corpn. The body session, on Aug. 31, will include a paper on "Budgeting Body Construction and Tool Costs," by N. H. Manning, Briggs Mfg. Co. Extreme pressure lubricants and the causes and effects of sludge formation in motor oils will be discussed at a session devoted to lubricants.

A feature of the passenger car session on the evening of Sept. 1 will be an address by C. F. Kettering, General Motors Corpn., on "The Engineer's Place in the Economic Picture," and an address by E. C. Elliott, president, Purdue University, on "Engineering the Knocks and the Knots." Other sessions will be devoted to brakes, fuel economy, tractors, Diesel engines, aircraft and airplane engines.

Machinery Institute Opens New York Office

MACHINERY and Allied Products Institute is opening a new Eastern office at 2 West 45th Street, New York City. This office will be directed by M. J. Reed. The institute is announcing that, unlike most other newly formed code organizations, it is limiting its membership solely to already established trade associations, such as the National Machine Tool Builders Association. Individual machinery firms seeking to become allied with the Machinery and Allied Products Institute are being informed that they must first join the trade association covering their own particular sector of the machinery field and through that body become identified with the larger machinery institute.

Lukenweld to Build Union Pacific Engine Frame

LUKENWELD, INC., division of Lukens Steel Co., Coatesville, Pa., has been awarded the contract by Winton Engine Corpn., Cleveland, for the manufacture, in welded rolled steel construction, of the complete engine structure for the 600-hp. Winton engine which will power the new 110-mile an hour light-weight passenger train of the Union Pacific System. Parts to be built by welding consist of the engine frame proper, the oil pan and 12 cylinder heads. The engine will be a V-type, twin-six unit, direct-coupled to a generator, which in turn will supply power to the driving motors.

High-strength alloy steel will be used for the engine frame, and the welding technique will be such as to assure welds of as high strength as the base metal. The entire engine frame will be subjected to radiographic examination by means of radium.

Gray Iron Foundry Code Submitted to the Industry

AFTER preliminary conferences with the Administration in Washington, the steering committee of district delegates of the gray iron industry, in conjunction with the Gray Iron Institute, has completed the draft of the gray iron code. It has been submitted to all members of the industry with assent forms to be signed and returned to the committee.

In addition to the customary mandatory clauses and the usual definitions, the principal articles and schedules of the proposed code are reproduced below so that IRON AGE readers may be informed concerning them.

ARTICLE II

Sect. E. Hours of Work

(1) *Factory employees.* On and after the date of the acceptance of this code, the maximum hours of work for all employees, except those employed as maintenance repair men, engineers and firemen, shall be not more than 48 hours in any one week and not more than 40 hours per week averaged over each six months' period. The first six months' period shall begin with the acceptance of the code.

(2) *Salaried employees.* Office and salaried employees covered hereby receiving less than $35 per week shall work not more than 48 hours in any one week and not more than 40 hours per week averaged over any six months' period.

Sect. F. Minimum Rates of Pay

(1) *Factory employees.* On and after the effective date the minimum rate of wages for employees in the gray iron foundry industry, except for office boys and girls, learners and casual labor, shall be as follows:

For the States of North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas, which are the states located in what is known as the Southern area, the minimum wages shall be 25c. per hour.

For the remainder of the United States, the minimum wages shall be:

For cities of 500,000 and over, including the metropolitan district forty (40c.) per hour.

For cities between 250,000 and 500,000, including the metropolitan district, thirty-nine cents (39c.) per hour.

For cities between 25,000 and 250,000, thirty-eight cents (38c.) per hour.

For cities of less than 25,000 population, thirty-seven cents (37c.) per hour.

(2) *Office and salaried employees.* The minimum wages of office and salaried employees covered hereby shall be not less than the following weekly rates:

In cities having a population of 500,000 and over including the metropolitan district, at the rate of $15.00 per week.

In cities having between 250,000 and 500,000 including the metropolitan district, not less than $14.00 per week.

In towns of less than 25,000 population not less than $13.00 per week.

The population and outlying metropolitan districts used for dividing the areas mentioned above will be that shown in the "Fifteenth Census of the United States, Metropolitan Districts, Population Areas."

(3) Piece work rates which will not yield the above minimum rate of pay at the ordinary rate of production shall be increased to produce at least the above minimum wage rates.

(4) *Exceptions.* Office boys and girls, learners and casual employees shall be paid at a rate not less than eighty (80) per cent of the minimum wages provided herein but the total amount paid to such employees shall not exceed in any calendar month five (5) per cent of the total amount paid by such employer to all employees covered by the provisions of this section.

(G) *Prohibition of Child Labor.* On and after the effective date no employer shall employ any minor under the age of sixteen (16) years, provided, however, that where a state law requires a higher minimum age, no person below the age specified by such state law shall be employed within that State.

ARTICLE III
ADMINISTRATION

(A) For the purposes of administration of this code, the gray iron foundry industry shall be divided into geographical divisions as set forth in the by-laws of the Gray Iron Institute, the agency through which this code is to be administered. These geographical divisions are referred to as districts, and are established at large foundry centers in such a manner as to maintain a close contact with the local problems of the industry.

(B) To effectuate further the policies of the Act, a code committee of the Gray Iron Institute is hereby designated to cooperate with the Administrator, as a planning, and fair practice agency for the gray iron foundry industry. This committee is to consist of six representatives of the gray iron foundry industry elected by the members of the code by a fair method of selection, to be approved by the Administrator, and in addition thereto, three members appointed by the President of the United States to act in an advisory capacity.

Said code committee may from time to time present to the Administrator recommendations based on conditions in the industry as they may develop, which will be to effectuate the operation of the provisions of this code and the policy of the National Industrial Recovery Act. Until such time as this committee shall have been selected, as provided above, the steering committee sponsoring this code shall serve in this capacity.

(C) Said code committee is also set up to cooperate with the Administrator in making investigations as to the functioning and observance of any provisions of this code, at its own instance or on complaint by any person affected, and to report the same to the Administrator.

(D) This code and all the provisions thereof are expressly made subject to the right of the President, in accordance with the provision of Clause 10 (b) of the National Industrial Recovery Act, from time to time to cancel or modify any order, approval, license, rule or regulation, issued under Title 1 of said Act.

(E) The code committee of this industry and any or all persons having anything to do with the regulation of the gray iron foundry industry under this code shall be free from any liability for libel arising from any of their acts in connection with the administration of the code, when done in good faith.

ARTICLE IV
STATISTICS AND REPORTS

Provides for Certified Reports from Code Members as Required

ARTICLE V
METHODS OF UNFAIR COMPETITION

To accomplish the purpose contemplated by this Act, the following practices are hereby declared to be "Unfair methods of competition":

(a) To sell any product(s) or service(s) below the cost of such product(s) or service(s).

(1)—For this purpose, cost is defined as the cost of direct labor, plus the cost of materials, plus overhead, plus six per cent on invested capital, including an amount for the use of any plant facilities employed, as determined by cost accounting methods recognized in the industry. (The standard cost system of the Gray Iron Institute, in effect at this time, shall be the only authorized method of keeping costs, and the reference to cost of

product in this code refers to such as determined by said cost system.)

(b) Making secret payment such as allowance of rebates, credits, subsidies, discounts, commissions or like concessions, whether in the form of money or otherwise.

(c) Undertaking to do work or to furnish or receive material on terms other than those set forth in the contract between the parties.

(d) Extending to certain purchasers special privileges and concessions, including allowances for machining and/or welding (except where explicitly agreed upon to repair specific defective castings), pattern repairs, pattern construction, pattern insurance, or other services not extended to all buyers by the industry, under like terms and conditions.

(e) Entering into quantity contracts with buyers without obligation on their part to take delivery of the quantities specified in the contract or on the quotation, done for the purpose of giving special unwarranted prices.

(f) Either directly or indirectly discriminating in price between different purchasers of gray iron castings, when the effect of such discrimination may be substantially to lessen competition or tend to create a monopoly, *provided* that nothing herein contained shall prevent discrimination in the price between purchasers of gray iron castings on account of differences in the grade, quality or quantity of gray iron castings sold.

(g) Paying, promising to pay or supplying to any agent or any intermediary, without the knowledge of his principal, of money gratuities, commissions or other consideration of any character for the purpose of inducing or compensating for a sale.

(h) The defamation of a competitor by words or acts which untruthfully call into question his business integrity, his ability to perform his contracts or fill his orders, his credit standing or the grade, quality or prices of his goods.

(i) The publication by word of mouth or writing of any proceedings of any meeting held in connection with this code for the purpose of damaging any competitor or competitors, or which results in such damage.

(j) To make any sale other than under the terms of the standard sales agreement attached hereto as Exhibit "B," as revised by the Gray Iron Institute, March 11, 1931, and approved by the National Association of Purchasing Agents, Inc.

ARTICLE VI

ENFORCEMENT PROVISIONS

Sets Up Procedure in Investigating Complaints Made to the Code Committee

SCHEDULE "A"

Defines Three Classes of Members and Method of Financing Through Dues

SCHEDULE "B"

STANDARD SALES AGREEMENT AND TRADE CUSTOMS IN THE GRAY IRON FOUNDRY INDUSTRY

Revised March 11, 1931

Approved by National Association of Purchasing Agents, Inc.

STANDARD SALES AGREEMENT AS ADOPTED BY THE GRAY IRON INSTITUTE, Inc.

All quotations are made and all castings are sold upon the following terms and conditions:

1. Unless otherwise agreed, quotations

must be accepted and patterns furnished the foundry within thirty (30) days from date of quotation.

2. All castings are sold as rough castings, f.o.b. cars, foundry point. Terms—thirty (30) days net, from invoice date, unless otherwise stated.

3. Claims for error in weight or number must be made within ten (10) days after the receipt of castings.

4. Foundry is responsible for the replacement of castings rejected due to foundry defects and such castings must be reported and returned to the foundry within ninety (90) days after their receipt. Foundry is not responsible for machine work, welding, labor charges or other losses or damages caused by defective castings unless otherwise agreed in writing.

5. Foundry is not responsible for loss of or damage to patterns by fire or other casualties beyond its control.

6. Foundry shall not be liable in damages for failure to deliver as a result of fires, strikes, differences with employees, accidents or other causes beyond its control.

QUOTATIONS

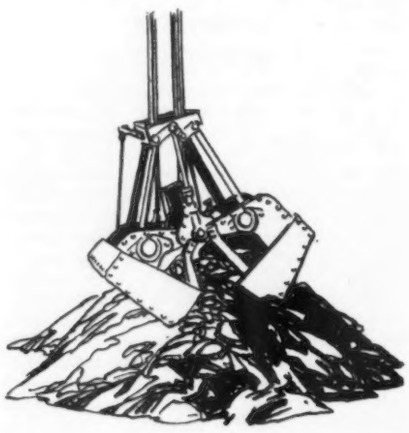
1. Blue prints submitted for estimating purposes should be marked with rough casting weight, if known, or an estimated weight upon which quotation will be based. A detailed description of the pattern equipment should be furnished.

2. When quotations involve the making of piece prices, definite weights shall be established and agreed upon, and quotations shall be subject to revision on any variation from the established weights.

3. Unless otherwise specified by the foundry, quotations are based on castings with gates, fins and other projections removed to approximately the contour of the pattern.

ORDERS

4. No order shall be changed unless notice of revision is made and accepted



in writing before work is in process. If work is in process, customer is to be charged for any castings made as well as cost of cores, molds or equipment discarded because of such changes.

5. Cancellations of orders are to be made only by mutual consent of buyer and seller.

6. Unless otherwise stipulated, the customer shall accept an overrun of ten per cent above quantities specified on order. However, the foundry is to make an effort at all times to furnish as near the exact quantity specified as operating conditions will permit.

7. If customer requires special production service to secure unusual deliveries, an extra charge shall be made.

PATTERNS AND CORE BOX EQUIPMENT

8. Customer must supply equipment in condition to produce economically the quality and quantity of castings required.

9. An extra charge will be made if patterns require stopping off or if skeleton or sweep pattern equipment is furnished.

10. Foundry is not responsible for variations existing between blue prints and equipment supplied by customer.

11. All pattern, core boxes and loose pieces thereof, should be marked properly for identification.

12. Follow boards, core driers and similar devices when required, are to be furnished by customer.

13. Repairs and changes to patterns by customer's orders will be made at expense of customer.

14. All freight, drayage, boxing and crating charges on patterns, both to and from the foundry, shall be assumed by customer.

15. Pattern storage facilities are provided by foundry for active patterns only. Patterns not in use for a period of six (6) months will be returned to the owner or will be subject to storage charges.

Chicago Scrap Yards On 40-hr. Week

ALL scrap iron yards in Chicago and surrounding territory are put on a 40 hr. weekly basis and a minimum wage of 37½c. per hr., beginning Wednesday, Aug. 16, according to an announcement by the Institute of Scrap Iron and Steel, Inc., as the result of action taken at a meeting of Chicago Chapter of the Institute of Scrap Iron and Steel. A resolution was adopted at the meeting voluntarily putting into effect the labor provisions of the code of the Institute of Scrap Iron and Steel in this district.

A pneumatic system for transporting samples to the physical and chemical laboratories is in use at the Longwy works of Les Hauts Fourneaux de la Chiers. Long steel cartridges carry hot bar samples which weigh about 1½ lb. each from the Bessemer department and the electric furnaces, and prompt return of the test results is obtained through the system.

Steel Founders' Society Submits Code to Washington

THE code of fair competition for the steel casting industry has been submitted to the Administrator by the Steel Founders' Society of America. Extracts from this code, of interest to purchasers and users of steel castings, as well as to foundrymen, are given below:

ARTICLE I
DEFINITIONS

Section 3 — The term "the industry" means and includes the business of producing and/or selling steel castings in the United States. The Industry embraces two main groups of castings which are commonly known in the trade as "miscellaneous castings" and "specialties."

Section 4—The term "miscellaneous castings" means that group of steel castings commonly known in the trade under that name and produced by foundries to the order of the buyers from the buyers' designs, patterns and specifications, such castings usually being sold in the rough.

Section 5—The term "specialties" means that group of cast steel products commonly known in the trade under that name and primarily designed and engineered by the foundry companies producing them, produced from patterns and/or other production equipment belonging to the producer, and sold as finished or semi-finished devices or parts thereof.

* * * *

ARTICLE III
SCOPE

Section 1—The labor and general provisions of this code as set forth in Articles I to XIII inclusive, shall apply to the entire industry; in view, however, of the divergent producing and selling methods applying to the two main groups of castings, namely, miscellaneous castings and specialties, separate provisions are set forth covering the standard trade customs and unfair trade practices of each group.

Section 2—This code shall be applicable with respect to the production and/or sale of steel castings, regardless of whether the producer or the seller is also engaged in any other industry, provided, however, that this code shall apply to and affect that part of the business only which relates to the steel casting industry.

* * * *

ARTICLE V
ADMINISTRATION

Section 1—The Board of Directors of Steel Founders' Society of America shall be the general agency for the administration of this code and may

(a) For the purpose of keeping the President informed as to the observance or non-observance of this code and as to whether the industry is taking appropriate steps to effectuate in all respects the declared policy of the National Industrial Recovery Act, require from any member of the industry, in the event of complaint, duly certified reports in such form as may hereafter be required by the Government or any branch or bureau thereof.

(b) Require such reports from individual companies as in its judgment may be necessary to advise it adequately for the administration and enforcement of the provisions of this code; provided, that all statistical data filed in accordance with the provisions of this paragraph shall be confidential and the data of one member of the industry shall not be revealed to any other member of the industry. The board of directors or its duly authorized representatives shall have access to any and all statistical data that may be furnished in accordance with the provisions of this paragraph, but only for the purpose of administering or enforcing the provisions thereof.

(c) Upon complaint of interested parties or upon its own initiative make such inquiry and investigation into the operation of this code as may be necessary, unless a supervisory agency has been appointed as provided in Section 1 of Article VII for the sub-division of the industry to which said complaint relates.

(d) Make rules and regulations necessary for the administration and enforcement of this code.

* * * *

ARTICLE VI
HOURS OF LABOR, RATES OF PAY, AND OTHER CONDITIONS OF EMPLOYMENT

Section 2—(a) The basic processes in the industry are of a continuous character and cannot be changed in this respect without serious adverse effect upon production and employment. As demand for the products of the industry, and therefore for labor, shall increase, hours of labor for employees in the industry must necessarily increase; but, except in the case of executives, those employed in directing or supervisory capacities and in technical or other highly skilled work, and their respective staffs, and so long as employees qualified for the work required shall be available in the respective localities where such work shall be required, and having due regard for the varying demands of the consuming and processing industries for the respective products, none of the members of the industry shall cause or permit any employee to work at an average of more than forty (40) hours per week in any six-month period, such periods to be computed from the effective date of this code.

(b) After the date of the employment by any member of the industry of any employee, such member shall not knowingly permit such employee who shall also have performed work for one or more other employers, to work for such member such number of hours as would result in a violation of the code had all such work been performed for such member.

Section 3—None of the members of the industry shall employ in or about its plants in the industry any person under sixteen (16) years of age.

Section 4—For the purposes of this code, the wage districts described in Schedule C, annexed hereto, have been established.

Section 5—(a) Until changed by amendment of the code as hereinafter in Article IX provided, the minimum rates of pay per hour which shall be paid by members of the industry for general labor in the industry in the respective wage districts described in such Schedule C shall be the rates set forth in Schedule D annexed hereto. None of the members of the industry shall pay general laborers in its employ in the industry in any such district any rate of pay less than the rate specified for such district in such Schedule D. Such rates of pay shall not, however, be understood to be the maximum rates of pay for their respective districts, but, until changed as aforesaid, none of the members of the industry shall be required to pay its general laborers in the industry in any of such districts a rate of pay higher than the rate specified for such district in such Schedule D, except as such member shall have agreed to pay such higher rate in any agreement heretofore or hereafter made by such member with its employees.

(b) The basic pay rates so established shall affect all other pay rates but the spread between various classes of labor as determined by the experience of the industry shall not be affected. The foregoing provision shall not be so construed as to require any member of the industry to make any increase in the rate of pay per hour to be paid by such member to any of its employees in any wage district that will result in a rate of pay per hour which shall be higher than the rate of pay per hour paid to employees doing substantially the same class or kind of labor in the same wage district by any other member of the industry which shall have increased its rates of pay per hour in accordance with such provision.

(c) In the case of employees performing work for which they are paid per piece of work performed, the minimum rate of pay which each member of the industry shall pay for such work shall produce the

minimum rate of pay per hour provided in this code for general labor at such plant.

Section 6—The provisions as to minimum rates of pay shall not affect those employees who, by reason of age or infirmities, are not engaged in productive labor, except that the rates now paid such employees shall not be decreased.

* * * *

ARTICLE VII
GENERAL PROVISIONS

Section 3—It is the consensus of opinion in the industry that until such time as the demand for its products cannot adequately be met by the fullest possible use of existing steel foundry melting capacity, such capacity should not be increased. Accordingly, except with the approval of a three-fourths (¾) vote of the board of directors, none of the members of the industry shall initiate any increase in such capacity; provided, however, that nothing herein contained shall be construed to forbid substitution of one melting process for another, if such substitution shall not result in substantially increased capacity for production.

* * * *

ARTICLE XII
VIOLATIONS

Violation of any of the provisions of this code, or amendments thereto, or of any of the rules and regulations established thereunder, is an unfair trade practice and shall be subject to the penalties provided in the National Industrial Recovery Act.

* * * *

ARTICLE XIV
STANDARD TRADE CUSTOMS AND UNFAIR TRADE PRACTICES

Section 1—With respect to the production and/or sale of miscellaneous castings, the standard trade customs which shall be observed, and the unfair trade practices which are condemned are set forth in Parts 1 and 2, respectively, of Schedule E, annexed hereto. Such standard trade customs and unfair trade practices set forth in Schedule E shall have no application to that part of the industry engaged in the production and/or sale of specialties.

Section 2—With respect to the production and/or sale of specialties, the standard trade customs which shall be observed, and the unfair trade practices which are condemned, are set forth in Parts 1 and 2, respectively, of Schedule F, annexed hereto. Such standard trade customs and unfair trade practices set forth in Schedule F shall have no application to that part of the industry engaged in the production and/or sale of miscellaneous castings.

Section 3—The members of the industry shall be responsible for keeping their employees, agents and respresentatives fully informed as to the standard trade customs and unfair trade practices which relate to their employment.

Section 4—Indulgence in any of the unfair trade practices, or violation of any of the standard trade customs, set forth in such schedules, respectively, or any amendments thereof, or any additions thereto, shall be deemed to be unfair methods of competition in commerce within the meaning of the Federal Trade Commission Act as amended, and using or employing any of such unfair methods of competition shall be deemed to be a violation of the code, and any member of the industry which shall directly, or indirectly, through any officer, employee, agent or representative, knowingly use or employ any of such unfair methods of competition shall be guilty of a violation of the code.

* * * *

SCHEDULE D
MINIMUM RATES OF PAY FOR GENERAL LABOR

	District	Minimum Rates, General Labor—Cents per Hour
1-A.	Eastern District	35
2-A.	Buffalo District	38
3-A.	Southern District	30
3-B.	Arkansas District	35
4-A.	Johnstown District	37
4-B.	Pittsburgh-Wheeling District	40
4-C.	West Virginia District	37
5-A.	North Ohio District	40
5-B.	South Ohio District	37
6-A.	Chicago District	40
6-B.	Indiana-Illinois District	37
6-C.	Detroit District	40
6-D.	Michigan District	37
7-A.	Colorado District	40
7-B.	St. Louis District	37
7-C.	Kansas City District	35
7-D.	Oklahoma District	35
7-E.	Midcontinent District	35
8-A.	Seattle District	38
8-B.	San Francisco District	37
8-C.	Los Angeles District	35
8-D.	Utah District	39
8-E.	El Paso District	30

SCHEDULE E

This Schedule relates solely to the production and/or sale of miscellaneous castings, and has no application to specialties.

PART 1
Standard Trade Customs

For all purposes of this code, the standard trade customs of the miscellaneous castings branch of the industry are defined as follows:

Section 1—All requests for quotations should give actual or estimated rough weights of the castings, but actual weights shall be used as a basis for billing.

Section 2—All quotations on castings shall be exclusive of pattern equipment; the latter, if made by a member of the industry or requiring alterations, shall be an extra and separate charge to the purchaser at not less than cost. A detailed description of wood or metal pattern equipment should be furnished by the purchaser.

Section 3—Unless otherwise specified, castings are sold as unmachined castings with gates, heads, risers, fins and other projections removed to approximately the contour of the pattern; any machining specified shall be paid for by the customer at not less than cost.

Section 4—Terms of payment shall be net thirty (30) days from date of shipment. A discount of one-half of one per cent may be allowed providing payment is made within ten (10) days from date of shipment.

Section 5—All castings shall be sold F.O.B. the plant of the member of the industry with freight allowed to destination.

Section 6—Suitable pattern equipment shall be furnished or paid for by the customer.

Section 7—Patterns, coreboxes and loose pieces thereof shall be properly marked for identification.

Section 8—All transportation charges on pattern equipment to and from the plant of a member of the industry shall be paid by the purchaser.

Section 9—All packing and crating cost in excess of one dollar ($1.00) for transportation of patterns to and from the plant of a member of the industry shall be paid by the purchaser.

Section 10—Insurance on patterns against fire and the elements shall be the responsibility of the purchaser.

Section 11—Members of the industry shall be responsible for loss or damage to pattern equipment only when due to careless handling or negligence on the part of such members of the industry, but not when due to fire or other causes beyond their control.

Section 12—Pattern changes or repairs which become necessary on account of ordinary wear shall be made at the purchaser's expense.

Section 13—When the purchaser furnishes skeleton patterns, coreboxes, sweeps, conjunction patterns or other than regulation pattern equipment, which increase the cost of production, a minimum extra charge of twenty per cent (20%) will be made.

Section 14—Changes in orders shall be confirmed in writing by the purchaser.

Section 15—All agreements shall be contingent upon fires, strikes, accidents, or other causes beyond the control of the member of the industry.

Section 16—Cancellations or modifications of orders must be mutually agreed to by the member of the industry and the purchaser.

Section 17—Members of the industry shall not be responsible beyond the extent of replacing castings rejected due to imperfect workmanship and material. Such castings must be reported or returned by agreement to the maker within a reasonable time after shipment, and castings to replace rejected castings shall be shipped F.O.B. plant of the member of the industry, freight allowed to destination.

Section 18—Members of the industry shall not be responsible for machine work, labor charges or other expense incurred by the customer on castings which are rejected as defective.

Section 19—Any inspection by outside individuals or agents, performed at the request of the purchaser, shall be paid for by the purchaser.

Section 20—Members of the industry shall not be liable for consequential, special or contingent damages.

Section 21—When chemical composition, except phosphorus and sulphur, is specified by the purchaser, a member of the industry shall not be held on physical tests and vice versa, except by agreement.

PART 2
List of Unfair Trade Practices

For all purposes of this code, it shall be an unfair trade practice for any mem-

ber engaged in the miscellaneous castings branch of the industry to do any of the following acts:

Section 1—Make or promise to any purchaser or prospective purchaser of any product, or to any officer, employee, agent or representative of any such purchaser or prospective purchaser, any bribe, commission or split-commission, gratuity, gift or other payment or remuneration, directly or indirectly.

Section 2—Undertake to do work or furnish castings on terms other than those set forth in the contract between the parties.

Section 3—Extend to certain purchasers special privileges or concessions, including allowances for machining and/or welding (except where explicitly agreed upon to repair specific imperfect castings), pattern alterations, or other services not extended by the industry to all buyers under like terms and conditions.

Section 4—Purchase from customers goods and/or services at prices higher than the market for such goods and/or services, for the purpose of influencing or inducing the purchase of castings.

Section 5—Absorb all or any part of the machining cost of castings sold as machined castings.

Section 6—Enter into quantity contracts with buyers without obligation on their part to take delivery of the quantities specified in the contract or on the quotation, for the purpose of giving special unwarranted prices.

Section 7—Either directly or indirectly discriminate in price between different purchasers of steel castings, when the effect of such discrimination may be substantially to lessen competition or tend to create a monopoly, *provided*, however, that nothing herein contained shall prevent differentiation in the price between purchasers on account of differences in the grade, quality or quantity of steel castings sold, or the credit standing of the purchaser.

Section 8—Disseminate, publish or circulate any false or misleading information relative to any product or price for any product of any member of the industry or the credit standing or ability of any member thereof to perform any work or manufacture or produce any product, or to the conditions of employment among the employees of any member thereof.

Section 9—Sell or advertise for sale and/or mark steel castings with the intent to mislead or deceive purchasers or prospective purchasers regarding their quality, composition or service features.

Section 10—State in the invoice of any product sold by a member of the industry as the date thereof a date later than the date of the shipment of such product, or include in any invoice any product shipped on a date earlier than the date of such invoice, for the purpose of furnishing such product at prices lower than would otherwise prevail or for the purpose of extending the customer's time of payment.

Section 11—Substitute any castings superior in composition or heat-treatment to that specified, when to obtain such superiority an additional cost of more than $2.50 per ton of castings to the member of the industry is necessitated, under market conditions as of Aug. 1, 1933, and when such substitution is for the purpose of furnishing such castings at prices lower than would otherwise prevail.

Section 12—Cancel in whole or in part or voluntarily permit the cancellation in whole or in part of any contract of sale of any product, except for a fair consideration.

Section 13—Make any sale or contract of sale of any product of any description which does not fully describe such product in terms customarily used in the industry.

Section 14—Make promise of delivery for the purpose of inducing a purchase when in the knowledge of the member of the industry such promise is impossible of execution.

Section 15—Violate any other provision of this code, whether or not herein defined as an unfair trade practice; or use or employ any practice which the Board of Directors shall designate as an unfair trade practice, after notice thereof shall be given to the President and to participants under the code.

Section 16—Make any sale or contract of sale of any castings below cost.

SCHEDULE F

This schedule relates solely to the production and/or sale of specialties and has no application to miscellaneous castings.

PART 1

Standard Trade Customs

For all purposes of this code the standard trade customs of the specialties branch of the industry are defined as follows:

Section 1—Specialties are sold by the piece, device, unit or set and not on a weight basis.

Section 2—The price of specialties may include such parts or other material not necessarily castings as may be necessary to complete the device.

Section 3—All patterns and/or other production equipment used in the manufacture of specialties shall be the property of the producer.

Section 4—Changes in orders shall be confirmed in writing.

Section 5—All agreements shall be contingent upon fires, strikes, accidents or other causes beyond the control of the member of the industry.

Section 6—Members of the industry shall not be liable for consequential, special or contingent damages.

Section 7—Any inspection by outside individuals or agents performed at the request of the customer shall be paid for by the customer.

Section 8—Specialties should be inspected and accepted at the plant of the producer.

PART 2

List of Unfair Trade Practices

For all purposes of this code it shall be an unfair trade practice for any member engaged in the specialties branch of the industry to do any of the following acts:

Section 1—To make terms of payment in connection with sales for domestic use more favorable to the customer than thirty days net cash from date of invoice.

Section 2—To make for the purpose of influencing a purchase any promise as to delivery or other matters which obviously is impossible of performance.

Section 3—To violate any trade customs or to employ any unfair trade practices which may be established for any product classification by the administrative agency for such classification appointed in accordance with Article VII of this code.

Westinghouse Now Under the Blue Eagle

ALL works and offices of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and its subsidiaries began operations under the provisions of the National Recovery Act on Aug. 15, at which time the law became effective for the electrical manufacturing industry as set out in the code of the National Electrical Manufacturers' Association, approved by President Roosevelt.

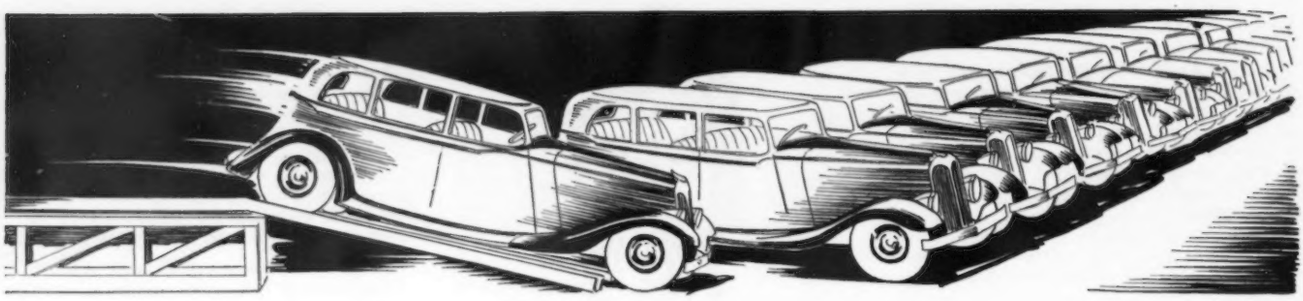
Blow Pipe Makers Organize in Chicago

ILLINOIS BLOW PIPE ASSOCIATION is being formed in Chicago. This is a State association but is planned by its founders to bring all blow pipe manufacturers together into a national organization. Officers for the Illinois unit are T. C. Miller, Cyclone Blow Pipe Co., president; Robert Johnson, United States Blow Pipe Co., vice-president; J. G. Ericksen, Invincible Blow Pipe Co., treasurer, and R. L. Baker, Chicago Blow Pipe Co., secretary.

July Trackwork Shows Small Increase

PRODUCTION of trackwork in July, according to American Iron and Steel Institute, was 2982 net tons. This compares with 2471 tons in June, previously the largest month's output in 1933. This tonnage includes all special or fabricated T-rail trackwork for domestic and export use with T-rails of 60 lb. or over.

Suggestions for selecting wire wheel brushes are included in Catalog No. 185, 32 pages, published recently by the Osborn Mfg. Co., Cleveland. There is also a table of diameters, gages of wire and recommended spindle and surface speeds. A section devoted to paint and varnish brushes includes a chart of brushes for applying paint, varnish and shellac to wood, concrete and metal surfaces. The catalog also lists platers, wire scratch and other industrial brushes.



▲▲▲ THIS WEEK ON THE ASSEMBLY LINE ▲▲▲

NRA Problems Cloud Automotive Outlook

DETROIT, Aug. 15.

ALTHOUGH motor car production continued the past week at a rate which still promises total assemblies in excess of 200,000 units this month, the enthusiasm so pronounced in automotive circles since late in April for the first time gave way to a less buoyant mood. This is accounted for by the multitude of problems facing the industry in connection with NRA. The automobile code, providing for a maximum workweek of 35 hr., has not yet had a hearing and Mr. Ford's attitude toward it has not been revealed. It is no secret, however, that he is bitterly opposed to unionization of his company. Next year's models are in the preliminary stages, yet prices of parts and raw materials cannot be accurately figured. It looks as though parts makers, which long have been a price door mat on which automobile builders wiped their feet, may take advantage of their own code to get more for their products and once again live instead of merely exist. The industry still is harassed by attempts at unionization on the part of the American Federation of Labor which has organized two local unions in Flint and one in Lansing in addition to six locals in Detroit. Adjustment of working schedules in individual plants to conform to the new conception of a shorter week is absorbing the attention of production executives. Manufacturing costs are mounting, yet motor car companies realize that it would be suicidal to their business during the remainder of the year to raise retail prices. Fortunately they are finding second quarter profits a cushion to soften the shock of higher costs.

Despite all of these problems, the consideration of which has toned down enthusiasm in the trade, a strong underlying current of optimism remains. Whether or not the fondest hopes of the Federal Government are attained in the NRA campaign, automotive executives are firmly convinced that the country is on the road to economic recovery and are mapping their 1934 plans accordingly. One of the more important makers, for example, is preparing a program of impressive proportions which includes expenditures for tooling up far greater than a year ago. Particularly are sales eyes fixed on the recuperating agricultural market, which normally yields a sizable percentage of the total automobile business, especially in the low-price field.

Steel Purchases Tapering

Steel mills can find little solace in the automobile trade in the next 30 days. Purchases of steel for current models are about at an end, although the tonnage moving into automotive plants on old contracts will continue at a fairly good rate all month. Initial buying for new models probably will not occur until the latter part of September. Practically all factories will be turning out present lines through September and possibly into October. Shutdowns for the change-over to new models will be short, in sharp contrast with the weeks of idleness in many plants last year. Summer vacations, in which most companies freely indulged during the last two or three years, are markedly absent this year. Introduction of 1934 lines will generally be postponed until at least November. In the case of a manufacturer in the medium-price field, plans were approved by the management to close down the latter part of August for the change-over, but an unexpected flurry of orders resulted in a hurried cancellation and the issuance of instructions to continue manufacture of the present model throughout the month.

STEEL companies are girding themselves for a first-class battle over the application of the one-price policy when the steel code becomes effective. All motor car makers, but more particularly Ford, General Motors and Chrysler, have traditionally been granted concessions because of their large tonnages and they are not expected to surrender these privileges in a hurry, even in the name of NRA. This battle probably will not take place until next month, when purchases for the first run of 1934 cars are made.

The reinstatement of the practice of quoting a Detroit base price on merchant steel bars is understood to be only for the interim until the steel code becomes effective. The code specifically abolishes this practice and the industry has no intention of seeking to alter this provision.

Equipment Buying Is Reviving

Equipment buying is showing definite signs of reviving. The Ternstedt Mfg. Co. placed orders the past week for machine tools totaling about $25,000 and purchases of single machines from miscellaneous users have increased. Chevrolet's tooling program for 1934 is understood to include $150,000 to $200,000 worth of equipment for its Flint, Mich., plant. Chrysler Corpn., which has been a steady purchaser for both new and used machine tools for several months, is contemplating further expenditures in line with its plans for expanding its manufacturing facilities. In some cases in which production does not justify the addition of a second shift, manufacturers are resorting to the installation of new tool equipment with a force of operators to meet the requirements of the proposed automobile code.

The National Automobile Chamber of Commerce estimates July production of its members at 178,506 units. With 55,000 added for the Ford Motor Co., the industry's output last month was about 234,000 units. Assemblies this month should be over

200,000 cars. Preliminary estimates for September, admittedly little better than a guess at this time, are 150,000 units. Chevrolet's August total still stands at 65,000 units and Ford's at 55,000. Chrysler's production should be 40,000 to 45,000 units. Hudson has increased its current month's schedule by 1000 units.

Detroit Notes

Great Lakes Steel Corpn. has not slackened its pace of maintaining operations at 100 per cent of ingot capacity. . . . In the first seven months of this year General Motors sold to consumers 487,062 cars, compared with 510,060 in the entire year of 1932. Sales to dealers in the same period amounted to 520,308 units, as against 472,859 units in all of last year. . . . Ford is now using a synthetic resin base enamel on its entire line of cars. This finish has been utilized for three years for commercial bodies and colored wheels. . . . Chrysler has developed a mechanical striping gun for use in its paint shops. The gun is equipped with two interchangeable nozzles giving any width of stripe. Paint flows by gravity from two reservoirs so that no air pressure or mechanical aid is required. The striping operation is so simplified that women operators can do the job. . . . Nitrided alloy cast iron liners for automobile engine cylinders are being made in England and France. The liners contain a small amount of aluminum, which facilitates the hardening operation, and also small proportions of nickel and chromium. They are said to show a high Brinell hardness. . . . The Electric Rotary Steel Co., a month ahead of its schedule, has already been making experimental runs of steel.

... PERSONALS ...

NATHANIEL S. REEDER has been appointed general manager for the receivers of the Pressed Steel Car Co. in full charge of plant operations. In addition to these duties, he will continue as president of the American Steel Corpn. of Cuba. His headquarters will be at McKees Rocks, Pa. Mr. Reeder was graduated from Cornell University in 1896. He joined the Pressed Steel Car Co. in 1902, and has served in many different capacities since that time. From 1905 to 1910 he was in charge of a subsidiary, the Canada Car Co., Ltd., which was later merged with the Canadian Car & Foundry Co. He was elected vice-president of the parent company in 1910 and a director in 1915.

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DAVID F. AUSTIN, heretofore manager of sales in the Cincinnati district for the Carnegie Steel Co., has been appointed manager of sales in the Pittsburgh district, succeeding the late Dennis Crowley, Jr. WILLIAM E. BLACKBURN, assistant manager of sales in the Pittsburgh district, has been made Cincinnati district sales manager, succeeding Mr. Austin.

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F. W. ALTORFER has been made Eastern district sales manager, with offices in New York, for the National Acme Co., Cleveland, succeeding WILLARD A. JOHNSON, who has been transferred to Cleveland to handle special sales assignments.

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J. C. FOX, chief chemist and metallurgist of the Doehler Die Casting Co., New York, has changed his headquarters to the Toledo, Ohio, plant of the company where the executive offices are now located.

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W. J. MACKENZIE, formerly vice-president of the Interstate Iron & Steel Co., now a part of the Republic Steel Corpn., has been placed in charge of sales and supervision of metallurgy of the alloy steel division of the Youngstown Sheet & Tube Co. He has made his headquarters in the Chicago office of the Sheet company at 111 West Washington Street. Mr. MacKenzie first became identified with the alloy steel industry in 1913 with the old United Steel Co. at Canton, Ohio, and has been continuously associated with the manufacture and sales of alloy steels for the past 20 years.

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DR. A. B. KINZEL, chief metallurgist, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., on a recent trip to Europe received the degree of Doctor of Science from the University of Nancy in Lorraine, France. While abroad he also delivered two lectures.

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H. S. CURRIER has been appointed mill representative of the Inland Steel Co. attached to the company's Detroit district sales office. For the last eight years he has been associated with the Detroit office of the Otis Steel Co.

N. S. REEDER

D. F. AUSTIN

W. E. BLACKBURN

Monel Shafts for Miss America X

FINAL laboratory tests on the Monel Metal shafts for Gar Wood's Harmsworth Trophy defender "Miss America X" have just been completed and reveal a high range of physical properties. They have been shipped to Detroit for tests in actual service.

Each shaft is 1⅝ in. in diameter and 10 ft. 4 in. long. They have a breaking strength of 110,000 lb. per sq. in. and a yield point of 100,000 lb. per sq. in. The tests reveal an elongation of 18 per cent in 2 in. and a 60 per cent reduction of area. They have a modulus of elasticity of 26,000,000 and are strong enough, if they could be used vertically as a lifting bar, to lift a load of 131 tons. Each of the twin shafts on Miss America will be required to transmit 3170 horsepower.

Mare Island Navy Yard, Mare Island, Cal., will take bids Aug. 22 on 195 tons of cold-rolled sheet steel, under Schedule No. 494.

THIS WEEK IN WASHINGTON

Steel Code Undergoing Final Pass Through N R A Mill

But Finish Likely to Be Marred by Inclusion of Irreconcilable Viewpoints

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, Aug. 15.—Promulgation of the steel code at an early date was said to be under consideration today as a committee from the American Iron and Steel Institute went into conference with Administrator Hugh S. Johnson and Deputy Administrator Kenneth M. Simpson. Mr. Simpson had charge of the one-day hearings on the steel code, July 31. The representatives include President W. A. Irvin of the United States Steel Corpn. and President E. G. Grace of the Bethlehem Steel Corpn.

The conference between the Recovery Administration officials and steel executives is informal and has for its purpose that of all such conferences which follow hearings and studies by the Administration staff of codes that have been presented. The purpose is to iron out differences and to this end the Administration lays before adherents to codes the results and recommendations growing from analysis of codes.

The principal obstacle to the settlement of the steel code was the so-called open-shop declaration. With this provision formally withdrawn by President R. P. Lamont of the Steel Institute the question became greatly simplified. This despite loose reports that the steel industry was balking and might withdraw the code unless more definite settlement would be made of the organized labor-open shop issue. National Recovery Administration officials from the outset scouted the idea of the steel industry withdrawing its code. Desiring not to get mixed up in controversies, they have not authorized any statement on the subject, but they have frequently said informally and definitely that there will be a steel code. They also deny emphatically reports by sensational news seekers that the steel code has been delayed and that the steel industry is balking on it. These reports, together with reports that the steel industry would be "boycotted" by the Government unless the industry came quickly under either the blanket or permanent code, have neither hastened nor slowed down discussion of the steel code.

Boycott Talk Is Nonsensical

It is going through the same process preceding codes have gone through and subsequent codes will go through. The steel industry of course some time ago increased wages and shortened work hours. The National Recovery Administration has not indicated whether these adjustments come within the "Blue Eagle" requirements or not. Certain it is that the Government awarded naval vessel contracts since the steel code hearing and that a substantial part of the steel for the vessels has been placed. Moreover, the Government itself only last week directly awarded steel for naval vessels. It hardly looks like a "boycott" or any other such a senseless policy against the industry. No indication was given as to where the steel would be bought if not given to domestic makers. It would be necessary to go out of the country otherwise, inasmuch as 95 per cent of the industry comes under the code. Going out of the country to get steel is such a grotesque idea and so sharply opposed to the idea of the National Recovery Act that it is beyond the realm of reason.

DIFFERENCES that may exist between the steel industry and the National Recovery Administration over the code, it is hoped, will be ironed out without difficulty. The open shop and the closed shop officially are ruled out since the Administration has adopted a firm policy of prohibiting any so-called open-shop clauses in codes. This has been reiterated at a number of code hearings since the provision was first withdrawn from the steel code. It created sharp dissensions at hearings last week on the some 25 or 30 codes of the bituminous coal industry. The code representing the largest production carried an open-shop clause and its sponsors refused to strike it out despite the request of General Counsel Donald Richberg of the Administration. Nevertheless, it is the general belief that it will be withdrawn ultimately. If not it will be taken out by the Administration.

Hours and Wages At Issue

It is said that hours and wages are among the points in the steel code that remain to be finally decided upon. Despite the fact that the Steel Institute has formally notified the Recovery Administration that it can go no further on these points than it has gone, it is known that much pressure for additional yielding has been brought to bear. The underlying force back of this movement is organized labor. The "demand" of organized labor, not yet a factor in the steel industry, is for a 6-hr. day, 5-day week, with a basic hourly rate of 60c. Of course organized labor

expects no such thing. Not far different from this suggestion was that made by Miss Frances Perkins, Secretary of Labor. The institute proposal is for a 40-hr. week with minimum rates ranging from 40c. to 30c. per hour. The support given by Miss Perkins toward further shortening of the hours and further raising of wages has apparently been an important element in the issue.

WITH President William Green of the American Federation of Labor she also criticized the division of the country into 21 wage districts and there is no doubt that since the hearing opposition to allowing wage advantages to the South has increased considerably. The basing point system also was attacked by fabricators and others and developed queries by Mr. Richberg. Likewise opposition came from some cities that were left out as basing points.

It is assumed these points were all covered in the report of the Deputy Administrator in preparation for today's conference in order to permit discussion with the steel men and final agreement before the code is submitted to the President for his approval.

Publicity Campaign Vigorously Pushed

The campaign for the public to get under the "Blue Eagle" has been vigorously supported by President Roosevelt and General Johnson, and has gained a country-wide intensity not exceeded by the Liberty Loan drives of the World War days.

After President Roosevelt issued his order for purchases under the Blue Eagle, General Johnson declared "it would be curious if the Government dealt with firms not coming under the recovery program." The President's order provides that all Government contracts would be canceled if the contractor did not comply with the recovery code. By many this order was said to have direct relation to the Government contracts let and to be let which will represent a large proportion of the $3,300,000,000 public works program, calling for large quantities of steel and other materials. Most of the naval ships awarded will be paid for by funds the Navy Department received from the Public Works Administration.

ORGANIZED labor has vigilantes throughout the country to see that Blue Eagle agreements and permanent codes are lived up to and complaint is heard by many that this means has been taken to further unionize the country. Nor is there any doubt that organized labor has met with a great deal of success. It is said organized labor is increasing greatly its activities, especially in such basic industries as coal and steel. In coal it has met with as much opposition from radical labor organizations as it has from open-shop producers. Nevertheless, organized labor is protesting that the Administration is not adopting its 6-hr. day, 5-day week formula.

Organized Labor's Sailing Not Smooth

Organized labor checks closely upon code hearings and of course always has its own representatives present to testify. They invariably stress the fact that Section 7 of the Recovery Act provides employees with the right of collective bargaining through representatives of their own choosing and have been strongly upheld in this position by the National Recovery Administration. There is no dispute on this interpretation of the law; indeed it is almost the words of the law. Organized labor also has insisted successfully upon the deletion of any open-shop clause in a code. Yet all is not smooth sailing for the old union groups. Other labor organizations charge the old organized labor groups with as many abuses as organized labor charges non-union companies. So the matter of the labor organization which employees may choose for collective bargaining is becoming an issue between the old organized labor groups and some radical groups. The latter are gathering strength, but so far rate low in power when compared with the American Federation of Labor and affiliated bodies. The radical groups are given only perfunctory recognition at code hearings while many industrial organizations operating under old union contracts share with the National Recovery Administration in supporting the established organized labor groups.

ALTHOUGH company union declarations are being struck from codes, National Recovery Administration officials deny that company unions have been outlawed. While it has been pointed out that the Government could not "outlaw" company unions, contention has been made that the attitude of the Government aids in weakening their standing, though General Johnson has stated that the National Recovery Act will not be used as a vehicle to promote either organized labor nor the company union. He has said he will only enforce the law as it is given to him and therefore require enforcement of Section 7, giving employees the right of collective bargaining through representatives of their own choosing. On his return last week from the Fayette County, Pa., coal fields, Assistant Administrator Edward F. McGrady issued a statement which it was said was intended to correct printed reports concerning his speech to the miners.

McGrady Corrects Reports of His Speech

"Of course, I did not say that President Roosevelt had outlawed company unions," said Mr. McGrady. "I did tell them, and most emphatically, what the Recovery Law provides, namely—that no company can compel a man to join a company union as a condition of employment nor can any company refuse to employ a worker for joining, organizing, or assisting the labor union of his own choosing. These are the words of the law. The declaration was especially necessary to the miners who said that companies had tried to herd them into company unions and had then fired them for joining the United Mine Workers. In short, I said exactly the same as did General Johnson in his press conference yesterday (Aug. 8), as I see on my return."

The fact remains that General Johnson has also said that employees cannot be compelled to join either a labor or company union unless they choose to do so. This statement was made in response to complaints that organized labor had engaged in a campaign among employees throughout the country in which they were told the Recovery Act compelled them to join organized labor unions. It was also in response to reports that employees were told that the law required them to join company unions.

The labor provision of the National Recovery Act was challenged as to its constitutionality last week at hearings on the hosiery manufacturers' code. Attorney David R. Clark, representing one of the producers, said the labor provision giving labor the right to organize and bargain collectively is contrary to the Constitution. He contended that by agreeing to the code containing that provision —inclusion of the provision in codes is compulsory—hosiery manufacturers would waive their constitutional rights.

There have been other "challenges" and "defiances." But the Administration apparently is not taking them seriously. It does not appear to be concerned.

Navy Awards Plates and Shapes

WASHINGTON, Aug. 15.—The Central Iron & Steel Co., Harrisburg, Pa., was awarded 535 tons and the Worth Steel Co., Claymont, Del., 408 tons of plates for two submarines to be built at the Portsmouth, N. H., navy yard. The Enterprise Galvanizing Co. was awarded 46 tons. Shape awards were distributed as follows: John T. Hill Co. (Phoenix Iron Co.), 160 tons; Bethlehem Steel Co., 23 tons and the Carnegie Steel Co., 70 tons.

Bureau of Water and Power, Los Angeles, has taken bids on 4,950,000 ft. of galvanized steel wire strand and 430,000 ft. of copper-covered steel wire strand.

No Agreement Yet on Steel Code

Irvin, Grace, Girdler, Block and Morrow Meet with Recovery Board Members. Conference To Continue to Final Decision

(By Late Telegram, Aug. 15)

STEEL executives went into session this morning with Government officials to discuss the steel code. The steel executives included the following officials of the companies named:

W. A. Irvin, United States Steel Corpn.; E. G. Grace, Bethlehem Steel Co.; L. E. Block, Inland Steel Co., and Hugh Morrow, Sloss-Sheffield Steel & Iron Co., T. Girdler, Republic Steel Corpn.

The conference was held at the office of Miss Frances Perkins, Secretary of Labor, who took a prominent part in the deliberations. General Johnson was present during the first half hour of the conference and opened the session by outlining the NRA's attitude toward the code. Other officials of the National Recovery Administration at the hearing included Deputy Administrator K. M. Simpson, in charge of the steel code; his assistant, R. W. Shannon; Dr. Alexander Sachs, economist. General Hugh S. Johnson, administrator, conferred with the steel executives, Deputy Administrator Simpson and Miss Perkins, before the conference formally began. They are said to have especially considered the question of labor representation at the conference.

It was observed that the five steel company presidents were selected from five representative steel producing areas. Apparently this representation was chosen in order to give a picture of the entire steel industry as to wages, hours, basing points and labor conditions. R. P. Lamont, president, American Iron & Steel Institute; W. J. Filbert, comptroller, United States Steel Corporation, and E. T. Weir, chairman, National Steel Corporation, were also at the conference.

After the conference had been under way about two hours, Miss Perkins talked to the press. She said that there are many things to discuss and that it was probable the conference would last over tomorrow if not longer. Questions first taken up, she said, concerned hours and wages. The conference, she explained, had been divided into committees to handle different subjects. "We are trying to come to a common understanding of facts," she said. Opinions have no place in the discussion. Statisticians of the steel industry are presenting data as to hours, wages and other matters which were not available to the Government. "It is likely these data will require 24 hours of study by our own experts."

She said that an intensive study of the whole situation is being made in an effort to reach satisfactory conclusions and did not indicate that any sharp difference of views prevailed. Asked if the question of the open and closed shop was part of the conference, Miss Perkins replied that it was not and will not be. She said as to hours it was realized that the steel industry has the peculiar problem of work in what she called both the chemical and continuous processes. She said that there was no representation at the conference of the American Federation of Labor acting in official capacity. It was understood, however, that representatives of that organization were present, Miss Perkins herself, and with Donald Richberg, general counsel for the National Recovery Administration were considered as the official representatives.

Price Fixing Question Not Important

Miss Perkins said that she did not understand that price fixing had any part in the code but that if it does that would be a matter to take up with the Department of Justice. She apparently does not consider this point important, and on that issue is seemingly in agreement with the steel industry. Other sources indicated that not only are the rates of wages being made the subject of discussion but that likewise the question of differentials in rates of wages especially between the South and North is under serious study. Government officials have suggested that the spread between the two sections be narrowed. The Southern minimum rate is 30 cents an hour. The highest minimum rate in the North is 40 cents an hour.

A stir was created when William Green, president of the American Federation of Labor, walked into the conference after it had been under way for some time. As Green entered the conference room two steel executives, according to a statement Green made to the press, arose and approaching Miss Perkins spoke to her. She then called Green aside and is said to have told him that the steel people objected to his presence. Perplexed, Miss Perkins was unable to decide what to do The steel people, according to Green, took the matter into their own hands and rising en masse walked into an adjoining room. Green said he lodged protest with the Labor Advisory Board and that the board adopted a resolution expressing disappointment at the action of the steel people. Green stated that he went to the conference as a member of the Labor Advisory Board and not as president of the American Federation of Labor.

At a late press conference with General Johnson the Green incident was brought up. General Johnson declared that Green was not his labor representative at the Steel Conference. He stated that Miss Perkins was his representative and was his labor adviser at the steel code hearing. Green, he said, was simply a witness at the steel code hearing. He said that he had nothing to do with Green's presence at the conference and if he went on any one's invitation it must have been that of Miss Perkins. General Johnson said that Green is a member of the Labor Advisory Board but that did not entitle him to be present at the Steel Conference.

General Johnson said the purpose of the Steel Conference is to reconcile three sets of figures as to hours of labor and rates of pay. The figures, he said, are those of Miss Perkins, Dr. Sachs and the steel manufacturers.

Malleable Code To be Filed

THE malleable code prepared by the Malleable Founders Society has been approved by that industry and will be filed in Washington late this week. Through coordination with other branches of the foundry industry through the Founders Council, provisions of this code relating to labor, wages, and hours will be similar to the code of the steel, gray iron and non-ferrous foundry industries.

Crucible Steel Reports Million Dollar Loss

Crucible Steel Co. of America reported a net loss of $1,024,772.32 for the six months ended June 30. The major portion of the loss was experienced in first quarter operations. During the half-year period an operating profit of over $400,000 was made, with the loss mainly attributable to plant overhead and non-operation of mines. The company reports a current total surplus of over $22,000,000, which is about 25 per cent of the complete valuation of real estate, plant, equipment, and mine properties.

During July, according to the report, the Crucible Steel Co. operated at somewhat over 50 per cent of capacity, which together with complete compliance with NRA objectives, resulted in almost a 100 per cent payroll increase. A 15 per cent wage advance has been effected, and working hours have been shortened.

Steel Output in Four-Point Decline as Trade Grapples with Code Problems

Uncertainties Growing Out of Operations under the Blue Eagle, as Well as Seasonal Influences, Affect Demand—Scrap Off at Chicago

STEEL demand is yielding to the retarding influence of codification difficulties and seasonal recessions in consumption. Incoming business has dropped off materially in Chicago, Pittsburgh and other leading centers, and the national average for ingot output has fallen four points, now standing at 53 per cent of capacity as compared with 57 per cent a week ago.

At Chicago production has declined from 53 to 47 per cent, at Pittsburgh it has dropped from 49 to 45 per cent, at Buffalo from 57 to 51 per cent, in the Cleveland-Lorain district from 67 to 65 per cent, in eastern Pennsylvania from 46 to 45 per cent, in the Wheeling district from 85 to 80 per cent, and in the South from 75 to 54 per cent.

UNCERTAINTIES growing out of the National Recovery program are responsible in large part for the downward trend in iron and steel business. Sellers feel that they will not have a firm foundation for steel prices until wages in the coal industry are settled. Although strike disturbances in the western Pennsylvania coal fields have subsided, the wage rates and working conditions that will finally be established are still unsettled, pending the adoption of a coal code.

Iron and steel consumers, on the other hand, are unwilling to make further purchases of materials until they find a way out of some of the perplexities that have arisen from signing up under the Blue Eagle. Many of them, having raised wages and shortened hours, now fear that they cannot obtain compensatory increases in their prices, realizing only too well that the final arbiter on prices is the ultimate consumer. Having long since exhausted their cash reserves and having no large "receivable" accounts to fall back upon, they frankly doubt their ability to make out under the "new deal." They are particularly apprehensive of losses on fixed price contracts taken before they subscribed to the blanket code. Other concerns have followed the dictates of the code as to hours and wages only to find themselves confronted with strikes. Where higher wage rates and shorter hours have resulted in smaller weekly pay envelopes, workmen have almost invariably balked, being apparently unwilling to "do their part" to the extent to sacrificing something so that more men may be employed.

SEASONAL reaction in steel demand is most noticeable in the automobile industry. Purchases of steel for current models have been virtually completed and initial buying for new models will probably not occur until late in September. But code complications also have affected the attitude of motor car builders. Hesitating to risk an advance in their retail prices during the remainder of this year, they face higher costs incident to the new basis of wages and hours under which they are now working, together with chronic labor difficulties growing out of persistent efforts to unionize their plants. Under the circumstances, they are in a mood to offer stubborn resistance to the one-price policy on steel which will become effective with the adoption of the iron and steel code. Meanwhile they are still succeeding in obtaining some concessions, particularly on automobile body sheets.

STRUCTURAL steel awards, at 6500 tons, compare with 8450 tons a week ago. Both structural steel and concrete bar lettings are suffering because of the slowness with which the public works program is getting under way. One of the larger pending public projects was brought nearer to the point where it will engage iron and steel capacity when Cleveland this week placed general contracts calling for the purchase of 24,000 tons of cast iron and steel pipe and fittings.

Railroad buying remains at a low ebb, and Western roads have grown even more cautious about expenditures because of a decline in traffic in drought-stricken agricultural areas.

PRICES of ground shafting have been advanced $5 a ton, in line with the recent increase in cold-finished steel bars. Coke prices have lost some of their buoyancy with the passing of strike difficulties. Furnace grade has declined from $2.75 to $2.50 and foundry from $3.50 to $2.75. Scrap has given ground at Chicago and THE IRON AGE composite has receded from $12.25 to $12.08 a ton, the first decline since May. The finished steel and pig iron composites are unchanged.

The emergency freight rates which have been in effect since early in 1932 will terminate on Sept. 30. The surcharge on finished steel, as well as non-ferrous metals, is 2c. a 100 lb. The surcharge on pig iron and scrap is 12c. a net ton.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Aug. 15, 1933	Aug. 8, 1933	July 18, 1933	Aug. 16, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	$17.34	$17.34	$17.34	$13.84
No. 2, Valley furnace	16.50	16.50	16.50	14.50
No. 2 Southern, Cin'ti	17.73	17.73	17.61	13.82
No. 2, Birmingham	13.00	13.00	13.00	11.00
No. 2 foundry, Chicago*	17.00	17.00	17.00	15.50
Basic, del'd eastern Pa.	17.09	17.09	17.09	14.00
Basic, Valley furnace	16.00	16.00	16.00	13.50
Valley Bessemer, del'd P'gh.	18.89	18.89	18.89	16.89
Malleable, Chicago*	17.00	17.00	17.00	15.50
Malleable, Valley	16.50	16.50	16.50	14.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	82.00	82.00	82.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.				
Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.598	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh	1.65	1.65	1.60	1.45
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.00

Finished Steel	Aug. 15, 1933	Aug. 8, 1933	July 18, 1933	Aug. 16, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.25	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.30
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	2.95
Hot-rolled sheets, No. 10, P'gh	1.65	1.65	1.65	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.75	1.75	1.75	1.65
Wire nails, Pittsburgh	2.10	2.10	2.10	1.95
Wire nails, Chicago dist. mill	2.15	2.15	2.15	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.60
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material				
Per Gross Ton:				
Heavy melting steel, P'gh	$14.00	$14.00	$13.25	$8.50
Heavy melting steel, Phila	12.00	12.00	10.75	6.50
Heavy melting steel, Ch'go	*10.25*	10.75	10.75	5.75
Carwheels, Chicago	10.50	10.50	10.50	6.00
Carwheels, Philadelphia	12.75	12.75	12.75	8.50
No. 1 cast, Pittsburgh	11.75	11.75	11.25	9.50
No. 1 cast, Philadelphia	12.50	12.50	12.25	8.00
No. 1 cast, Ch'go (net ton)	10.50	10.50	10.50	6.00
No. 1 RR. wrot., Phila	12.00	12.00	10.75	8.50
No. 1 RR. wrot., Ch'go (net)	9.00	9.00	9.00	3.75

Coke, Connellsville				
Per Net Ton at Oven:				
Furnace coke, prompt	*$2.50*	$2.75	$2.50	$2.00
Foundry coke, prompt	*2.75*	3.50	3.00	3.00

Metals				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	8.75	8.75	8.75	5.12½
Lake copper, New York	9.00	9.00	9.00	5.50
Tin (Straits), New York	*43.75*	44.60	48.00	23.30
Zinc, East St. Louis	5.00	5.00	5.00	2.75
Zinc, New York	5.37	5.37	5.37	3.12
Lead, St. Louis	4.35	4.35	4.35	3.05
Lead, New York	4.50	4.50	4.50	3.20
Antimony (Asiatic), N. Y.	*7.00*	7.25	7.50	5.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Aug. 15, 1933	1.979c. a Lb.	$15.94 a Gross Ton	$12.08 a Gross Ton
One week ago	1.979c.	15.94	12.25
One month ago	1.973c.	15.90	11.58
One year ago	1.976c.	13.64	6.92
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1933	1.979c., Aug. 8;	1.867c., Apr. 18	$15.94, Aug. 1;	$13.56; Jan. 3	$12.25, Aug. 8;	$6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.037c., Jan. 13;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25; Jan. 11;	13.08, Nov. 22

Output in Pittsburgh Area Off Four Points

Steel Rate in Wheeling District Also Declines—Scrap Prices Sustained on Mill Purchases—Strike Difficulties Subside

PITTSBURGH, Aug. 15.—Steel activities in the Pittsburgh district have finally begun to yield to the retarding influences of code complications and seasonal recessions in consuming industries. With new bookings and reduced volume, mills are gradually catching up on back-logs, and the movement of practically all classes of steel has slackened.

Specifications from automobile manufacturers have contracted in line with seasonal tendencies. Shipments of full-finished sheets and strip steel to the automotive industry are slower, although other grades of sheets for miscellaneous requirements are holding their own. Heavy hot-rolled products still are suffering from the continued absence of important buying by the railroads, which are taking only minor tonnages, principally for repair work. Structural steel is depressed by the delay in releasing work on the Federal rehabilitation program, the launching of which will probably have to await codification of the steel industry. Reinforcing bar demand is affected by similar influences. Further deferment of Government road work will probably postpone benefit of bar and mesh contracts to local mills until next spring.

Despite lack of demand, bars, plates and shapes are being held strictly to 1.60c., Pittsburgh. With old contracts for sheets nearing completion, sheet prices will soon be more definitely established. In the meantime, fill-in orders are being taken at the prices set on Aug. 1. No price irregularities are noticeable on galvanized, hot-rolled annealed and cold-rolled, but concessions on auto body sheets still rule. Hot-rolled strip steel is steady at 1.65c., and cold-rolled at 2.25c., Pittsburgh.

Tin plate mills are still being pushed for deliveries and are consequently maintaining operations at about 95 per cent of capacity. Steel ingot production in the Pittsburgh district this week will average 45 per cent, a loss of four points since last week. Steel operations in the Valley and nearby northern Ohio mills are unchanged at 60 per cent. Output in the Wheeling district is off five points at 80 per cent.

Pig iron quotations are nominally firm and the scrap market is steady. Relief from strike difficulties has settled the fuel markets, with coal and coke quotations reflecting softness.

Pig Iron

With only minor disputes lingering in the western Pennsylvania coal fields, interest in pig iron has subsided. Tentative inquiries for basic iron that were stimulated by a possible prolongation of the coal strike have disappeared, and current activity has narrowed down to carlot buying. Shipping releases are also not so insistent, and aggregate movement against contracts in the first half of August has fallen somewhat behind deliveries in the corresponding period in July. Prices, however, are still firm, with No. 2 foundry quotable at $17, Bessemer at $17.50 and basic at $16.50, f.o.b. Pittsburgh district furnace.

Semi-Finished Steel

Shipments to non-integrated makers of sheets and strip steel have slackened, but deliveries to tin plate mills are well sustained. Few consumers are specifying beyond their actual needs, and inventories generally are meager. The $26, Pittsburgh or Youngstown, price on billets, slabs and sheet bars is very steady. Forging billets are firm at $31, Pittsburgh, and wire rods are well maintained at $35, Pittsburgh or Cleveland.

Rails and Track Accessories

Miscellaneous demand has let up considerably. Carriers are evidently adhering to cautious buying policies and are specifying sparingly for track supplies. A large purchase of rails is in prospect, but negotiations still are in the early stages. Steel tie plates are nominally firm at the recently advanced price, and track bolts are strong at the reaffirmed quotation, for third quarter shipment.

Bars, Plates and Shapes

Shipments in the past week fell behind those in the preceding period. Aggregate movement in the first two weeks of August was considerably less than that in the first half of July. Release of a moderate tonnage of armor plate for Navy vessels is expected soon to reach a local mill. Plates for railroad repair work are in good demand. New inquiries for steel barges are scarce, and barge yards are gradually completing old orders. Little support for plates is coming from oil tank business. Fresh structural projects are fewer and restricted almost entirely to bridge construction. Lettings, however, showed some improvement in the past week. Definite betterment still awaits release of work in the Government rehabilitation program, which is evidently being deferred until codification of industries is completed. The bulk of the structural steel placed last week for Boulder Dam transmission towers will probably be fabricated on the Pacific Coast. About 25,000 tons for this work was placed with Tower Builders, Inc., representing a combination of Blaw-Knox Co., Western Pipe Co. and Consolidated Pipe & Construction Co., and 3500 tons with McClintic-Marshall Corpn. Partial launching of the Federal road building program has thus far failed to provide much demand here for reinforcing steel or steel road mesh.

Makers of bars, plates and shapes are adhering strictly to the 1.60c., Pittsburgh, price, although the scarcity of significant tonnage has provided little test.

Tubular Goods

Practically all classes of tubular products are dull. Only small-lot orders for standard pipe and mechanical tubing are in evidence. Oil country goods are still neglected. A Texas natural gas company recently awarded about 10,000 tons of 10-in. electric welded pipe to A. O. Smith Corpn. and 1500 tons to Republic Steel Corpn. for a natural gas line extension from Douglas to Tucson and Phoenix, Ariz. New line pipe projects are very scarce. The recent advances on lapwelded steel boiler tubes are well maintained. Charcoal iron tubing is quiet and quotably unchanged.

Cold-Finished Steel Bars

Ground shafting has been advanced $5 a ton in line with the recent increase on cold-finished steel bars. Demand for the latter product has abated in the past week, with virtually all classes of users narrowing their specifications. Shipments against old low-price contracts have not been entirely completed. Enough new business, however, has been placed at 1.95c., Pittsburgh, to establish the recent advance.

Wire Products

As shipments on old orders near completion, fresh inquiry and orders are brisk. Demand from the automotive industry is particularly well sustained, and the jobbing trade continues to specify generously for wire nails. All new business is taking full price schedules.

Sheets

A further contraction in demand is noticeable. The expected seasonal decline in automobile production has already influenced specifications for

auto body sheets, which are becoming relatively quiet. Galvanized sheets are in better demand, while hot-rolled and annealed sheets are moving steadily to the brewing trade. Sheet mills have already begun to slacken operations, which now average 55 to 57 per cent. Backlogs are being gradually reduced, though most mills expect to maintain present operating rates at least through August. Shipments against old contracts are expected to be completed soon, and all new business will be subject to recently established prices. Galvanized and hot-rolled annealed are firm at 2.85c. and 2.25c., Pittsburgh, respectively. Although the asking price for full-finished auto body sheets is held at 2.60c., the 2.30c. price has not entirely disappeared.

Tin Plate

Mills are still actively engaged on old commitments, and operations are unchanged at about 95 per cent of capacity. Current inquiry is brisk, but mills are reluctant to enter further commitments until late in the fall. Practically all makers are booked at capacity well into September, and, with demand from can manufacturers expected to be unrelaxed until fall crops are out of the way, tin plate mills will probably be able to maintain near capacity operations without interruption until near the close of the year, when rolling for next year's orders will start.

Strip Steel

Shipments against old contracts are expected to be completed soon, and, with new orders showing up rather poorly, strip mills are already reducing operating schedules. Specifications from automobile manufacturers are lighter. Some support is expected early next month, however, when demand opens up from radio makers and toy manufacturers. Hot-rolled strip is firm at 1.65c., Pittsburgh, on new business, and cold-rolled strip is well maintained at 2.25c., Pittsburgh or Cleveland.

Coal and Coke

With major strike issues practically settled, fuel markets are more normal. Furnace coke is now available at $2.50, Connellsville, though some sellers continue to ask as high as $3.50. With the possibility of a fuel shortage removed, however, little consumer interest is displayed in current offerings. Foundry coke prices have also eased off, regular brands now being available at $2.75. Premium brands of foundry coke are still posted at $4.50. Coal prices also have softened, with western Pennsylvania steam slack offered at 85c. to $1, mines.

Scrap

A mill purchase of approximately 2000 tons of No. 1 heavy melting steel at $14 and another sale into consumption at $14.50 have sustained the market for this grade at $13.50 to $14.50. Steel is still difficult to obtain at the current dealer offering price of $13.50. Demand for No. 2 steel is extremely light. With steel operations in this district tending lower, buyers are not disposed to discuss forward scrap needs. Most of the large consumers are covered for the remainder of the month, and little important buying is in immediate prospect. Cast grades and specialties are steady at unchanged levels. Brokers believe that, in spite of an expected lull in buying during the remainder of August, scrap prices will maintain present levels in view of the scarcity of offerings and the scant supplies on consumers' yards.

NRA Program Holds Back Buying at Boston

BOSTON, Aug. 15.—Pig iron sales the past week consisted of a few hundred tons, but deliveries against existing contracts showed a slight increase. There are no inquiries of importance in the market, melters preferring to wait for new developments in the NRA program before committing themselves further on raw materials. Some foundries maintain they cannot operate under the proposed "new deal" plan, and the most prosperous concerns are not enthusiastic about the outlook.

Business in scrap is very largely confined to scattered cars of No. 1 heavy melting steel, steel turnings, bundled skeleton, breakable cast, No. 2 steel and machinery cast for Pennsylvania consumption, and bundled skeleton, breakable cast, textile and machinery cast for New England consumption. The situation can be summed up as a standoff between brokers, who cannot raise their bids, and scrap owners, who apparently are in no hurry to dispose of their stocks.

Large Plate Projects Up for Bids on Coast

SAN FRANCISCO, Aug. 14.—Material estimates on the Grand Coulee Dam in Washington, for which $63,000,000 has been appropriated, have just been released by the United States Bureau of Reclamation. On completion the high dam will have required approximately 11,500 tons of reinforcing bars and 4000 tons of plates.

Bids are being opened at Pasadena on the Pine Canyon Dam conduit which will require 18½ miles of 36-in. pipe, calling for 4220 to 5080 tons of plates, according to alternate specifications. Swayne & Hoyt are taking bids at San Francisco on Aug. 31 on a ship that will require 4000 tons of plates and shapes.

Activity in the construction field has been confined largely to Governmental projects, with 781 tons of structural awards and 1820 tons of new inquiries being reported. Bar awards totaled 2063 tons, the placing of 1108 tons by the Los Angeles Bureau of Water and Power to Concrete Engineering Co. being the outstanding letting. New bar inquiries, including the requirements of the Grand Coulee Dam, amount to 12,743 tons.

Both mill and warehouse prices are firm, with the new price of 2.10c. on plates continuing strong. At San Francisco, warehouses have advanced cold-finished steel $7 per ton. Cast iron pipe prices are reported as being the firmest in three years. In general, greater confidence is evident in the trade because of anticipated activity.

Buffalo Steel Output Is Curtailed

BUFFALO, Aug. 15.—Shipments of pig iron are holding up well. Inasmuch as no quotations are being made on business subsequent to Oct. 1, there is little new business. Producers say there are indications that considerable new inquiry will come out for the fourth quarter.

Steel output here has been curtailed. The Lackawanna plant of the Bethlehem Steel Corpn. is now operating nine open-hearths instead of 11. Republic Steel Corpn. continues to operate eight, and Wickwire-Spencer Corpn. two. The Seneca sheet division of Bethlehem has reduced production slightly, running at 60 per cent instead of 70 per cent of capacity. A local maker will fabricate the structural steel, amounting to 250 tons, for the new German-American brewery in this city, and a Buffalo interest will supply 200 tons of reinforcing bars for the Danahy-Faxon building at the Niagara Frontier food terminal. Wire business is exceptionally brisk.

The scrap market is slightly softer, with little demand. No sales of consequence are noted and, with somewhat lessened open-hearth operation, the largest consumer is beginning to pile scrap again. Much of this is coming in by boat.

A rapid test for the adherence of paints to structural metal work has been devised by F. Chaudy. As described in *Le Genie Civil*, May 6, two faces of a flat steel tensile test piece were covered, one with a lead paint and the other with a red ochre paint. When dry, the specimen was pulled. On stretching to fracture, the oxide paint split and chipped where the elongation amounted to 22 per cent, whereas the lead paint suffered no damage from the amount of extension. The use of the lead paint is suggested as a standard of comparison in such a test.

Chicago Ingot Rate Falls Six Points to 47 Per Cent

Inflow of Steel Business Drops Sharply —Uncertainty Among Buyers Regarding N R A Codes Discourages Purchases—Scrap Prices Decline

CHICAGO, Aug. 15.—Reflecting a considerable contraction in the volume of incoming business, ingot production in the Chicago district has declined more than six points, standing at slightly under 47 per cent this week compared with 53 per cent a week ago. A blast furnace which has been running on basic iron also has been banked.

Bookings of practically all grades of steel have slipped to lower levels, although flat-rolled products have suffered less than bars and other heavier items. Specifications and releases have not kept pace with production; consequently mill backlogs are being eaten into substantially. Unless the declining trend of buying is arrested, an event which seems improbable, the ingot rate will slide off further next week.

Automotive tonnage is holding up fairly well, as is business from the brewing industry, but railroads do not yet reveal even faint signs of coming into the market for rails or rolling stock. The Santa Fe reports its car loadings off somewhat in the past week because of a smaller movement of farm products, due to abnormally small crops. The possibility of decreased revenue from this source may make Western carriers doubly cautious about equipment expenditures. The Union Pacific has not put out an inquiry for rails, as reported elsewhere, but may soon be in the market for 5000 tons.

Steel users generally are befogged by the uncertain status of NRA codes and will not liberalize their buying policy until the situation is clarified by definite action at Washington. Nevertheless the tone of the market is moderately cheerful, largely because the extent of the decline in steel operations has been far less than usual for this time of the year.

Pig Iron

Shipments to users this month are running ahead of those in July. This is not attributed to an increase in the foundry melt, but to the desire of users to take out all the tonnage coming to them on old contracts. With consumers generally protected on contracts for the current quarter and sellers not yet ready to take fourth quarter business, new transactions have been light. However, the volume of fill-in orders to meet immediate requirements has been surprisingly good. Foundries catering to the automotive trade, to manufacturers of beer bottling machinery and to makers of paper mill machinery are particularly busy. Prices are strong and unchanged.

Reinforcing Bars

New tonnages of road bars will soon be before the trade from a number of Mid-Western States that have received Federal aid. Illinois has received $17,000,000 and both Indiana and Michigan have obtained large sums. Orders have been placed for 600 tons of bars for grain elevators at Chicago and Milwaukee, and bids are going in on 170 tons for a post office addition at Des Moines, Iowa. On the whole, the market remains quiet, awards being unable to support shop output above 20 per cent of capacity.

Cast Iron Pipe

Large users of water at Milwaukee are objecting to the construction of the projected new water plant and as a result the commissioners have not yet applied to the Government for money. Eau Claire, Wis., is in the market for 1500 tons of pipe and Oshkosh, Wis., has purchased several carloads. The market remains very quiet pending definite action on some of the numerous projects that are before officials at Washington. Prices are firm.

Bars

Specifications and orders receded the past week, although the amount of miscellaneous business has been of fair proportions. The volume of bars going into the automobile industry has slackened and probably will continue to taper the remainder of the month. The present plan of booking bar orders at the current price on a day-to-day basis will be maintained until the steel code becomes effective. The matter of eliminating the differential of $2 a ton over the Pittsburgh price is still in the discussion stage, with no final decision arrived at. However, the uncertainty regarding the future price action of the mills, as well as the feeling of hesitancy which has seized upon buyers generally, is beginning to have a blighting effect on new business.

Wire Products

Although bookings have eased off somewhat the past week, they still are of sufficient volume to be a source of satisfaction to producers. The miscellaneous character of orders, reaching out into almost all classes of users, is testimony to the wide revival of buying. Utility companies, while taking a fair tonnage of electrical wire, are not supporting the market so well as other classes of consumers.

Coke

Despite the return of miners to their work in the Pennsylvania coal fields, consumers are still nervous about their fuel supply. This has a tendency, of course, to lend strength to the price of by-product foundry coke, which now at $7.50 delivered locally, is destined to advance Sept. 1.

Strip Steel

Hot strip mills have increased their operations this week, but production of cold-rolled strip steel has fallen off. The automotive industry still is supplying the bulk of the orders in both items.

Sheets

Releases from automobile manufacturers and beer barrel makers have materially aided district mills in holding operating rates at or near recent high levels. Orders from a miscellaneous run of users have dropped off, although they still are of fair volume.

Structural Material

The structural steel market continues dull, with highway bridge work for various States about the only active item. The opening of bids on 700 tons of steel for a post office at Des Moines, Iowa, has been postponed until Sept. 6. The Atlas Brewing Co., Chicago, will construct a building requiring 475 tons of steel.

Scrap

With steel operations declining and industry in general maintaining a watchful waiting policy pending the approval of various codes, the scrap market has sagged somewhat. District steel mills have purchased heavy melting steel at $10.50. In fact, one company bought 1000 tons at $10, but since this was a distress lot it scarcely represented the actual market. Hydraulic bundles have been sold to users at $9, a drop of 50c. a ton from last week. On the other hand, steel rails in less than 2-ft. lengths have brought $13, which is an advance of 50c. a ton. Rolled carwheels and railroad tires are off 25c. and No. 1 busheling, 50c. Extreme caution on the part of buyers is holding back purchases of scrap. In one notable case a steel company which had virtually decided to buy a sizable tonnage of melting steel for its Chicago district plant has backed out of the transaction and declares it will not place an order this month, even though its mill stocks are far from substantial.

Demand Eases Off in Eastern Pennsylvania

Rise in Tonnage From Railroads and Public Works Needed to Sustain Output—Warehouse Prices Advanced—Scrap Loses Buoyancy

PHILADELPHIA, Aug. 15.—Demand for both pig iron and steel has tapered off further in this district but the decline is considered to be seasonal. Early agreement on the steel code is hoped for in the expectation that it will be a stabilizing influence in the market.

The let-down in business became rather marked the middle of last week and is attributed not only to seasonal causes but also to the heavy specifications that went to mills before advances in prices became effective.

The change in the general market situation, however, is spotty. One maker of sheets reports a decline of about 20 per cent in commercial sheet business from the average rate for July, while plate business has picked up to that extent. Railroad plate business has let down considerably, but miscellaneous demand has increased. Some other mills, however, report a decline in plate, as well as shape and bar orders. If business is to be as good in September as it has been so far in August, mills say the tonnage must come from the railroads and public works, though not much is expected from the latter source that soon. This view is based on the fact that demand for automotive steel has fallen off.

Warehouse prices have been generally advanced $3 per ton.

Steel ingot production in this district has declined one point to about 45 per cent of capacity.

Pig Iron

Inquiry has declined slightly, but shipments are holding up well. Makers of gray iron castings are operating at a better rate than steel foundries. Prices remain firm.

Plates, Shapes and Bars

There has been a general tapering off in the market, though some makers report a pick-up in miscellaneous orders for plates. Inquiries from fabricators show a distinct drop. One producer of plates reports that business is running about 20 per cent over that of last month. The general decline in new business was expected both because of seasonal causes and the active specifying before price advances went into effect. Railroad buying has let down, but sellers hope that the carriers will come into the market for large requirements in September. They do not look for such a movement over the remainder of August.

It develops that the Carnegie Steel Co. has been awarded steel for two light crusiers and the Bethlehem Steel Co. has been given steel awards for four destroyers to be built by the New York Shipbuilding Co. Previously it was reported that steel for the cruisers had gone to Bethlehem and steel for the destroyers had been awarded to the Carnegie company. It is believed that it will be at least 30 days before rolling of the ship steel begins, inasmuch as designs and drawings will have to be prepared first.

The Concrete Steel Co. has been awarded 850 tons of reinforcing bars for the new tunnel of the Pennsylvania Railroad in Baltimore.

Sheets

New business has receded substantially, owing chiefly to decline in demand from the automotive trade. Mill backlogs, however, insure heavy operations for the next three or four weeks. A maker of commercial grades reports sheet business is off about 20 per cent compared with the July rate.

Warehouse Business

Prices have been advanced. The general rise is $3 per ton, applying to plates, shapes, bars and sheets. Business has fallen off considerably, but jobbers say they look for an early improvement.

Imports

The following iron and steel imports were received here last week: 4500 tons of chrome ore from Turkey; 150 tons of iron ore from Germany, 6024 tons of pig iron from the Netherlands, and 2035 tons from British India.

Scrap

Mills continue to hold off, confining purchases to immediate requirements chiefly. While there is no pronounced weakness, it is believed that prices might be shaded somewhat on firm offers.

Five Open-Hearths Taken off in South

BIRMINGHAM, Aug. 15.—Two blast furnaces were banked by the Tennessee Coal, Iron & Railroad Co. last week. These were the two at Ensley, on basic and recarburizing iron, which had been producing for the Ensley rail mill, now closed. Production for general lines of business has not changed, eight stacks being active. Sloss-Sheffield, Woodward, Republic and the Tennessee company each have two in operation. Shipments of pig iron are holding to a steady course, close to that of July. Current sales are light, due to previous bookings. Prices are firm at $13.

Cast iron pipe remains in the doldrums, with little relief as yet from the public works program. Scrap has been stronger of late.

Steel

New business has been receding during the past several weeks. The chief factor has been the curtailment of demand for heavier products, but other lines have also contributed to the decline. Operations, other than rail, have not been affected to any extent as yet, as there is sufficient backlog to maintain the present rate for awhile longer. The Ensley rail mill operated two days last week, after being closed down on Sunday, but is again inactive, probably for an indefinite period. Eighteen open-hearths were active in the South until Thursday, when the five at Ensley were taken off.

Scrap Advances at St. Louis

ST. LOUIS, Aug. 15.—Melters in St. Louis territory are ordering out pig iron to the limit against contracts, but there is no new business. Consumers are covered on their third quarter requirements, and makers have not opened their books for fourth quarter. Prices are unchanged.

No large structural steel jobs are in the offing, but fabricators report that the volume of business in small jobs has been both gratifying and encouraging. The State of Arkansas will open bids Thursday for highway projects requiring 200 to 225 tons of wire mesh and 125 to 200 tons of reinforcing bars.

Scrap

Scrap continues very strong, heavy melting steel and No. 2 railroad wrought having advanced 25c. a ton, and No. 1 locomotive tires, wrought iron bars and transoms, No. 1 machinery cast and railroad malleable having gone up 50c. Recent railroad offerings have gone to Western users. Stocks in yards are shrinking.

Steel Bookings Decline in New York District

While Shipments Remain in Good Volume, Consumers Are Disturbed by Difficulties Growing Out of Blanket Code — Freight Surcharge to Come Off Sept. 1

NEW YORK, Aug. 15.—Steel specifications remain in fair volume, but new business has fallen off. In some cases higher prices are a deterrent, especially for larger buyers, but more generally bookings are light because consumers previously covered their requirements and are now taking shipments against their commitments. It must be conceded, however, that there is a less confident attitude among buyers, owing to difficulties arising out of the NRA blanket code. Certain smaller consuming interests have raised wages and shortened hours and are now apprehensive lest they fail to obtain compensatory advances in the prices of their products. Being, in most instances, without cash reserves or a sizable backlog of receivables, they are in no position to bear the burden of additional losses for any length of time. Not infrequently compliance with the blanket code has stirred up labor trouble. Where higher wages and shortened hours have netted the workingmen a smaller weekly pay envelope than previously, they have protested, in some cases to the extent of striking. They are evidently unwilling to "do their part" to the extent of sacrificing something so that idle men may be employed.

On Sept. 30 the freight surcharge of 2c. a 100 lb. (10 per cent where the previously prevailing rate was less than 2c.) will be removed.

Prospective acceptance of the steel code will probably be followed by advances on steel pipe and plain wire. The increases on pipe will be in the larger sizes. Those sizes were sharply reduced at the beginning of April, and some of them remained entirely unaffected by the upward revision of July 1. Official adoption of the code is also expected to result in the adoption of various new quantity extras and the enforcement of old ones, thereby overcoming, in part at least, the objections of larger buyers to the single-price policy.

The code limit of 30 days for free credit to buyers has come in for considerable criticism. It is pointed out that such a provision is not practicable for certain classes of business. For example, a manufacturer supplying steel doors and partitions or other equipment for a new building must wait for his money from the general contractor, who in turn must wait for payment from the owner at stated periods as the structure approaches completion. Most building operations, of course, consume more than 30 days.

Construction activity remains at a low ebb. The chief new structural project is an addition to the local plant of the National Biscuit Co., calling for 1800 tons of shapes.

Pig Iron

Foundry melt is well maintained, and releases are in heavy volume with most consumers anticipating shipments. Bookings for the week aggregated 5800 tons, compared with 2600 tons for the previous period and 3400 tons a fortnight ago. Included in the week's total were 400 tons of foreign iron bought for fourth quarter by the A. P. Smith Mfg. Co., East Orange, N. J., and 2000 tons of domestic No. 2X foundry iron, purchased from yard stocks by a large consumer. Domestic furnaces are not yet taking fourth quarter business. Books will be opened at advanced price levels when code readjustments have been completed. Prices on Buffalo and eastern Pennsylvania brands are firm and foreign iron is moderately steady.

Reinforcing Steel

Private construction is in negligible volume, and the market is poorly supported by the spotty requirements of public works. Prices are nominal for sizable tonnages, although small lots are firmly held at 1.60c. for mill lengths or 1.75c. for cut lengths, Pittsburgh base. Joseph T. Ryerson & Son, Inc., will furnish 100 tons for a Queens County, N. Y., highway. New York State will shortly announce results of the Aug. 11 and Aug. 18 bids for highway mesh requirements. New Jersey is also taking figures on moderate highway and bridge needs.

Scrap

Prices are unchanged and firm on all grades. The market is less active, although potential consumer demand is unabated and shipments are in heavy volume. Brokers still hesitate to make heavy forward commitments, and large transactions are blocked because of the disposition of both buyers and sellers to withhold action pending possible readjustments under the steel and scrap codes. Furnace grades have not reacted to the code stringency, and quotations on turnings and borings are steady. Foreign shipments are negligible. Exporters continue unwilling to meet the price advances of a fortnight ago.

Scrap Prices Are Bid Up at Cincinnati

CINCINNATI, Aug. 15.—Pig iron buying, although in small lots, is being sustained consistently at about 400 tons a week, a rate which is close to normal for this time of the year. Foundry releases against contract have been accelerated to the highest rate of the year and the melt is slightly improved. Failure of machine tool foundries to receive substantial business is retarding the general increase in operations, although other melters report fair business. Some uncertainty persists over the National Recovery Act and its effect upon fixed price contracts, but the general tendency is toward greater optimism. A railroad is inquiring for about 800 tons of iron, of which 200 tons is charcoal.

Sheet mill operations are being sustained at about 70 per cent of capacity despite a tapering of demand to near 60 per cent. Backlogs are being reduced, but unfilled orders are still large enough to sustain operations at the present rate for another two weeks at least. Prices are strong, but no extension of quotations beyond the present quarter has been granted.

Dealers continue to bid the scrap market up to attract more material, but yard stocks have not been materially reduced. The trade is watching, with interest, the results of bids on a list of about 23,000 tons offered by the Louisville & Nashville. This road, during the last year, has been withdrawing its list after receipt of bids.

National Drawn Steel Sold in Receivership

THE plant of the National Drawn Steel Company, at East Liverpool, Ohio, was sold at receiver's sale the past week for $50,000. The plant originally was reported to have cost $2,000,000. The purchaser was the attorney for the Potters' Savings and Loan Co., the creditor who had initiated the receivership proceedings. The Bethlehem Steel Co., another creditor of the National Co., protested against the sale, but the complaint was not allowed.

Production Declines Further in Cleveland District

Cleveland-Lorain Ingot Rate Off Two Points to 65 Per Cent—Cleveland Places Contracts for 24,000 Tons of Pipe and Fittings

CLEVELAND, Aug. 15.—While delays in the adoption of the steel and other industrial codes in the NRA program apparently have checked the demand for finished steel, mills still have a good backlog of old orders, permitting the continuance of recent finishing mill operations, and new business continues to come out in fair volume considering the season of the year.

Ingot output in the Cleveland-Lorain territory this week declined two points to 65 per cent of capacity. The two Cleveland producers each took off an open-hearth furnace, but Lorain added another furnace, going back to 100 per cent capacity.

New orders for steel were fairly numerous during the week, but were largely for small lots and for fill-in purposes. Bars, hot-rolled strip and sheets were the most active items. While some of the orders are to add to stocks, most of the tonnage evidently is for early requirements. The automotive industry still has considerable steel to be shipped against July specifications, but very little new business is coming from that source.

The market generally has a very firm tone. Producers appear to be adhering to 1.65c., Cleveland, for bars and 1.60c., Pittsburgh, for plates and shapes, holding to one price for all consumers. Bars for the forging industry have been generally established at the regular base price, with the usual $5 a ton extra for forging quality bars.

Pressure is being exerted by some large consumers, particularly in the automotive field, for price concessions. While recent orders for some products, particularly cold-rolled strip, have not been large enough to furnish a test of prices that have been advanced, regular quotations are being adhered to on all forms of steel except possibly one or two grades of sheets.

Cleveland has made awards to five contractors for the laying of approximately 24,000 tons of pipe and fittings for 36 miles of water mains. The quantity of welded steel pipe required has been doubled to 5000 tons, as compared with original specifications. This will be in 36 to 48-in. sizes. The mains will take 17,500 tons of 12 to 24-in. cast iron pipe.

Pig Iron

New demand is confined to small lots for shipment before Oct. 1, and the aggregate tonnage is light. This is due in part to compliance by producers with the provisions of the code that forbids opening books for quotations more than 30 days before the start of a quarter. Many foundries, including automobile plants that placed orders before the last price advance, are accumulating stocks by taking shipments in excess of present requirements, and this evidently accounts for considerable increase in shipments this month over July. Prices are firm at $16.50, Cleveland, for foundry and malleable iron for inside and outside shipment.

Sheets

Some of the mills are well cleaned up on old orders and others have sufficient backlog to keep them busy well into September. While the demand from the motor car industry has declined, a moderate amount of business is being placed in small lots at the new prices. The market generally has a firmer tone, although there are still reports of prices lower than 2.25c. on hot rolled annealed sheets and of concessions on auto body sheets. Demand from the refrigerator industry has declined, but business is holding up well from stove makers.

Iron Ore

Shipments from Lake Erie ports during July amounted to 1,937,086 tons as against 428,457 tons during the same month last year. Shipments from these ports until Aug. 1 were 3,259,977 tons as against 963,455 tons up to Aug. 1 last year. Receipts at other than Lake Erie ports until Aug. 1 were 1,239,555 tons as compared with 288,548 tons for the same period in 1932. The dock balance at Lake Erie ports July 1 was 4,792,192 tons, as against 5,298,383 tons on the same date a year ago.

Warehouse Business

Quantity differentials on hot rolled steel have been revised by local warehouses effective Aug. 14. Base price applies to lots of 400 to 3999 lb. New differentials are for less than 400 lb., 50c. extra; 4000 to 7999 lb. 15c. discount; 8000 to 14,999 lb., 30c. discount; 15,000 to 39,999 lb., 50c. discount; 40,000 lb. and over 60c. discount.

Strip Steel

Specifications from some of the automobile manufacturers against old contracts, while lighter than in July, are holding up well, but are expected to decline in September. Some new business in small fill-in orders is coming from this source. All producers are now holding to 1.65c., Pittsburgh, for hot strip. The price of 2.25c., Cleveland and Pittsburgh, is being maintained on cold-rolled strip, although this advance has not been tested on round tonnages.

Wire Products

Jobbers are ordering quite freely to replenish stocks, which became very low, and wire is in good demand from bolt and nut manufacturers. Demand from agricultural districts is light.

Bars, Plates and Shapes

Mills still have a fair backlog of bar tonnage specified in July and a moderate amount of new business is coming out, considerable of this from small consumers who, not being on the list of preferential buyers, did not have the incentive to place orders last month. Not much activity is developing in the building field. The Erie Railroad has taken bids for 800 tons of structural steel for grade crossing elimination work in Elmira, N. Y., and Ohio has placed a highway bridge requiring 120 tons. Ohio will take bids Aug. 25 for road work requiring a small tonnage of structural shapes and reinforcing bars. Tanks for a local brewery have been placed requiring 400 tons of plates. Demand for plates for brewery work is still fair, although less active than during July.

Scrap

New demand from consumers is light. However, the market is firm, with no change in prices. Shipments are being held up by a Cleveland mill but have been released by a Valley consumer. There is a fair demand for heavy melting steel from Valley district dealers to fill outstanding orders.

Detroit Scrap Dull

DETROIT, Aug. 15.—Buying of scrap by consumers lagged the past week. There were few transactions to test prices, which with the exception of an advance of 25c. a ton in low phosphorous plate scrap are unchanged. The local steel plant is not expected to make a sizable purchase of scrap until late this month.

Whiting Corpn., cranes, foundry equipment and railway specialties, Harvey, Ill., has appointed C. F. Cate, 610 North Twelfth Street, Albuquerque, N. M., its representative in New Mexico.

Fabricated Structural Steel

Lettings Decline—New Projects in Fair Volume

AWARDS of 6300 tons were mostly in small tonnages and compare with 8450 tons a week ago. The only sizable booking was 1700 tons for the Manheim bridge at Justice, Ill. New projects of 9100 tons are the same total as was reported in the previous week and compare with 7000 tons two weeks ago. Two new jobs of 1800 tons each include the Dover-Newington State bridge in New Hampshire and a building for the National Biscuit Co., New York. Structural steel lettings for the week follow:

Los Angeles, 200 tons, Cereal Products Refining Co. brewery, to Truscon Steel Co.

King County, Wash., 100 tons, State highway paving structure, to Pacific Coast Steel Corpn.

NEW REINFORCING BAR PROJECTS

Boston, 340 tons, city hospital kitchen.

Des Moines, Iowa, 170 tons, addition to post office.

Milwaukee, 3168 tons, sewage plant extension; G. R. Fehr, Inc., 2755 South Thirty-fourth Street, Milwaukee, general contractor.

Little Rock, Ark., 125 to 150 tons of bars and 200 to 225 tons of wire mesh for highway projects; bids Aug. 17.

San Francisco, 120 tons, Irish-American Hall; bids rejected and new bids under advisement.

State of Washington, 283 tons, highway paving and structures in six counties; bids Aug. 29.

Valley County, Idaho, 104 tons, three State highway bridges; bids Aug. 22.

Grand Coulee Dam, Wash., 11,500 tons, final surveys being made.

STRUCTURAL STEEL AWARDS

NORTH ATLANTIC STATES

New York, 225 tons, 134th Street garage, to Fassler Iron Works.

Buffalo, 250 tons, German-American brewery, to Buffalo Structural Steel Co.

Creighton, Pa., 275 tons, addition to Pittsburgh Plate Glass Co. plant, to McClintic-Marshall Corpn.

SOUTH AND SOUTHWEST

State of Florida, 250 tons, two bridges in Dismal Swamp, to Virginia Bridge & Iron Co.

Halifax County, Va., 125 tons, highway bridge, to Virginia Bridge & Iron Co.

Lincoln City, Okla., 230 tons, highway bridge, to Missouri Valley Bridge & Iron Co.

CENTRAL STATES

State of Michigan, 395 tons, highway projects, to R. C. Mahon Co.

Justice, Ill., 1700 tons, Manheim bridge, to American Bridge Co.

Cleveland, 310 tons, Brewing Corpn. of America, to Republic Structural Iron Works, Tecumseh, Mich.

Cleveland, 230 tons, remodeling school buildings; 100 tons to Fort Pitt Bridge Works Co., 130 tons to several fabricators.

Cleveland, 114 tons, sheet steel piling for Fairchild Milling Co., to Carnegie Steel Co.

Newark, Ohio, 120 tons, highway bridge, to International Stacey Corpn.

WESTERN STATES

Monida, Mont., 350 tons, post office, to Pittsburgh-Des Moines Steel Co.

Humphrey, Idaho, 330 tons, Department of Agriculture highway bridge, to Pittsburgh-Des Moines Steel Co.

State of Colorado, 269 tons, bridges in four counties, to unnamed bidders.

Boulder Dam, Nev., 106 tons, anchor rods, etc., to John W. Beam Co.

San Francisco, 450 tons, concrete forms, Trans-Bay bridge, to Berkeley Steel Construction Co.

West San Bruno, Cal., 425 tons, County jail cells, to Judson Pacific Co.

Seattle, 165 tons, brewery, to Wallace Bridge & Structural Steel Co.

Long View, Wash., 150 tons, Long View Co. fibre plant, to Poole & McGonigle.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Dover-Newington, N. H., 1800 tons, State bridge; bids close Aug. 24.

New York, 1800 tons, National Biscuit Co. building.

Rochester, N. Y., 1500 tons, John Marshall High School.

Eagle Bridge, N. Y., 425 tons, State highway bridge.

Fallsburg, N. Y., 400 tons, two State highway bridges.

Salford Station, Pa., 200 tons, highway bridge.

York County, Pa., 150 tons, bridge for County commissioners; bids Aug. 26.

Montgomery County, Pa., 230 tons, two bridges for County commissioners; bids Aug. 24.

SOUTH AND SOUTHWEST

State of Virginia, 420 tons, Roanoke River bridge; Pittsburgh-Des Moines Steel Co. low bidder on general contract.

State of Oklahoma, 300 tons, highway bridges.

State of Texas, 200 tons, highway bridge.

Coconino County, Ariz., 190 tons, United States Bureau of Public Roads bridge; bids Aug. 31.

CENTRAL STATES

Chicago, 475 tons, building for Atlas Brewing Co.

Des Moines, Iowa, 700 tons, post office; bids postponed until Sept. 6.

WESTERN STATES

State of Colorado, 200 tons, highway bridges.

Culbertson, Mont., 900 tons, highway bridge; bids Aug. 23.

State of Idaho, 325 tons, United States Forest Service bridge on Dubois-Monida Forest highway; bids under advisement.

San Francisco, 1000 tons, ship for Swayne & Hoyt; bids Aug. 31.

Los Angeles County, Cal., 115 tons, widening

Last Minute Sales Leads

(Received too late for classification in our Plant Expansion Section)

Ethyl-Dow Chemical Co., a recently organized joint subsidiary of Ethyl Gasoline Corpn., 135 East Forty-second Street, New York, and Dow Chemical Co., Midland, Mich., has plans for new plant at Kure Beach on Cape Fear Peninsula, near Wilmington, N. C., for production of special commercial bromines for ethyl gasoline manufacture. Plant will include power house, pumping plant for seawater, machine shop and other structures. Cost about $1,000,000 with equipment. Ethyl Gasoline Corpn. is controlled by General Motors Corpn. and Standard Oil Co. of New Jersey, both New York.

A. J. Koenig, city manager, Fort Atkinson, Wis., asks bids until Aug. 22 for two gas engine-driven generators, two centrifugal pumps, one plunger pump, flow meters, steel gas collector and other equipment for new municipal sewage disposal plant. Cost about $42,500. Robert Cramer, 647 West Virginia Street, Milwaukee, is consulting engineer.

Schwarz Brewing Co., Corpus Christi, Tex., plans new six-story plant, with mechanical-cooling, bottling, storage and distributing, and other departments, boiler plant and machine shop. Cost over $400,000 with equipment.

Bureau of Reclamation, Denver, asks bids until Sept. 12 for two 3500-hp. horizontal shaft, double overhung, impulse-type hydraulic turbines, complete with oil pressure governors, hydraulic-operated shut-off valves and auxiliaries for regulating speed of units; also for two 3000-kva. generators, complete with direct-connected main exciters and pilot exciters, for Boulder power plant (Specification 545).

Chevrolet Motor Co., West Grand Boulevard, Detroit, let general contract to Martin Krausmann Co., 955 East Jefferson Avenue, for one-story addition, 90 x 125 ft., for gear and axle plant. Cost about $50,000 with equipment.

Bureau of Ordnance, Navy Department, Washington, asks bids until Aug. 21 for 128 5-in./38, and 32 5-in./25 gun barrel forgings, and 96 5-in./38 breech housing forgings; until Aug. 28, 1600 6-in. common projectiles, 100 6-in. illuminating projectiles, 41,600 5-in. antiaircraft common projectiles, and 6800 5-in. illuminating projectiles.

Cereal Products Refining Co., 1008 Towne Avenue, Los Angeles, Samuel A. Clarke, president, operating California Brewing Association, has purchased 5-acre tract at Vernon, Cal., as site for new multi-unit plant. Cost over $300,000 with equipment.

Board of Administration, Capitol Building, Bismarck, N. D., Ernest Wanner, executive secretary, asks bids until Aug. 31 for mechanical equipment for Grafton State School, Grafton, N. D., including sewage lift, electrical equipment, pipe lines for steam service, etc. Pillsbury Engineering Co., Minneapolis, is consulting engineer.

City Council, Defiance, Ohio, is considering new municipal electric light and power plant, and will arrange financing for $425,000 for project, including equipment.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until Aug. 21 for wrought iron stud link chain (Proposal 44406).

Common Council, Rogersville, Ala., W. C. Stone, clerk, plans early purchase of equipment for municipal waterworks, including steel tank and tower, deepwell pumping machinery, motors, 6 and 8-in. cast iron pipe, etc.

General Purchasing Officer, Panama Canal, Washington, asks bids until Aug. 25 for one motor-driven towing machine, and one motor-driven centrifugal sand pump (Schedule 2893).

Pioneer Brewing Co., Fond du Lac, Wis., is reconditioning its former brewing plant at cost of $50,000 under direction of N. W. Rowinski, consulting engineer, 1654 South Fifteenth Street, Milwaukee.

viaduct at Ionia Avenue; bids under advisement.

Los Angeles County, 140 tons, viaduct at La Tijera Boulevard; bids under advisement.

FABRICATED PLATE

AWARDS

Wilmington, Del., 120 tons, Wilmington Suburban Water Co. tank, to Pittsburgh-Des Moines Steel Co.

Pittsburgh, 365 tons, four tanks for Gulf Refining Co., to Pittsburgh-Des Moines Steel Co.

Cleveland, 400 tons, tanks for Brewing Corpn. of America, to Glascote Co., Cleveland.

Milwaukee, 500 tons, 98 tanks for Fred Miller Brewing Co., to Heil Co., Milwaukee.

NEW PROJECTS

San Francisco, 3000 tons, ship for Swayne & Hoyt; bids Aug. 31.

Mare Island, Cal., 210 tons, supplies for navy yard; bids Aug. 29.

Los Angeles, 100 tons, tanks for Metropolitan Water District; bids under advisement.

Grand Coulee Dam, Wash., 4000 tons, final surveys being made.

Pipe Lines

Peoples Gas & Power Co., Chariton, Iowa, plans about 45 miles of welded steel pipe line for natural gas. Cost over $100,000.

Standard Oil Co., Texarkana, Ark., is considering 4-in. crude oil steel pipe line from connection with present line at Mandeville, Ark., to point about 12 miles south.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 22 for 7060 ft. of 1-in. and 1200 ft. of ¾-in. black welded steel pipe; 8000 ft. of 2½-in., 14,000 ft. of 1½-in., and 27,000 ft. of 1-in. galvanized welded steel pipe (Schedule 490) for Mare Island Navy Yard.

City Council, Colorado Springs, Colo., E. L. Mosely, city manager, plans early call for bids for pressure water pipe line from hydroelectric power plant at Manitou to point near Cascade, Ute Pass. C. H. Bryson is engineer.

Metropolitan Water District, Los Angeles, has awarded 100 tons of 22-in. welded pipe to Southern Pipe & Casing Co.

Cast Iron Pipe

Eau Claire, Wis., will ask bids soon on 1500 tons of 8 to 30-in., class C, for new $250,000 water supply system.

Fond du Lac, Wis., closes bids Aug. 17 on 10,680 ft. of 6 to 12-in., class C; previously reported at about 7000 ft.

Ironwood, Mich., plans 6 and 8-in. pipe for extensions in water system. Cost about $70,000. Financing is being arranged.

Spokane, Wash., plans extensions in municipal water system, to cost over $1,000,000, including new 36-in. and 30-in. main trunk lines and distributing branches of smaller pipe. City Water Department is in charge.

Brownwood, Texas, plans installation of about 16,000 ft. for water system. Cost about $25,000, including new pumping machinery.

Lewiston, Idaho, will soon take bids for 6 and 8-in. pipe for new water line from Clearwater River. W. P. Hughes is city engineer and water superintendent.

Oakland, Cal., has taken bids on 2094 tons of 4 to 8-in., on which United States Pipe & Foundry Co. is low bidder.

McNeil Island, Wash., has taken bids on 238 tons, on which American Cast Iron Pipe Co. is low bidder.

Fresno, Cal., has taken bids on 400 tons of 6 to 10-in.

Ventura, Cal., has completed plans for about 200 tons of 10 and 16-in., class 150.

Reinforcing Steel

Awards 4350 Tons—New Projects 15,815 Tons

Queens County, N. Y., 100 tons, highway structures, to Joseph T. Ryerson & Son, Inc.

Buffalo, 200 tons, Danahy-Faxon warehouse, to a local bidder.

Baltimore, 850 tons, tunnel for Pennsylvania Railroad, to Concrete Steel Co.

State of Illinois, 100 tons, road work, to Calumet Steel Co.

Chicago and Milwaukee, 600 tons, grain elevators, to an unnamed bidder.

Manitowoc, Wis., 750 tons, plant addition for Rahr Malting Co., to Laclede Steel Co., St. Louis.

Denver, 200 tons, for Bureau of Reclamation, Specification No. 3268A, to Colorado Fuel & Iron Products Co.

Washington and Salt Lake Counties, Utah, 140 tons, State highway bridges, to Pacific Coast Steel Corpn.

Los Angeles, 1108 tons, material for Bureau of Water and Power, to Concrete Engineering Co.

Elevated Steel Water Tank Houses Aeration System

An elevated steel water tank recently completed by McClintic-Marshall Corpn., for the village of Garden City, L. I., contains a complete aeration system. This innovation in tank construction consists of a series of metal trays suspended from the roof trusses in such a manner that all incoming water cascades over them before entering the storage space. Large ventilator openings in the roof provide for intake air and the discharge of air and gases after aeration.

The tank, which is shown, is 67 ft. in diameter, and is supported by a 100-ft. 14-column tower, constructed of structural shapes without the use of lattices. The storage capacity is 1,000,000 gal., part of which is in the dome-shaped roof. The entire roof is made of copper-bearing steel plates, with copper-bearing rivets. Two 2-in. wrought-iron galvanized pipes supply the lime for water purification. Inlet and outlet pipes are 20 in. in diameter, and 6-in. pipes are used for blowoff and overflow. A stairway is built around the 9-ft riser pipe, and extends below the tank to the lower balcony. The range in head of 46 ft. results in a pressure variation of less than 20 lb. per sq. in. in the mains.

Railroad Emergency Rates Terminate Sept. 30

FACED with increased prices, buyers are anticipating reduced shipping costs after Sept. 30, when the railroad emergency charge, or surtax, automatically ceases. Considerable savings will be effected, since the present charges amount to 2c. a 100 lb. for carload and less-than-carload lots of sheet steel, tin plate, plates, shapes and bars, wire products and structural shapes. Zinc, copper, lead and other non-ferrous metals are likewise taxed at the 2c. rate. Pig iron and scrap, however, are assessed 12c. a net ton for carload lots, and 2c. a 100 lb. for less-than-carload shipments. All of the charges apply to either intra-state or interstate movements, and are the same irrespective of the distance shipped.

The Interstate Commerce Commission has been subjected to considerable pressure from the carriers to retain the surcharge for an additional period, but refused to yield. The revenue accruing from the surtax has been a decided boon to roads which have experienced drastically reduced operating incomes. In the 15 months prior to April 1 revenues from the surtax aggregated $74,744,279, and were transferred to the Railroad Credit Corpn., which functioned as a central bureau for advancing money or making loans to the more financially embarrassed lines. Since April 1 the railroads have been retaining the revenues from the emergency rates.

Railroad Equipment

Republic Steel Corpn. has purchased 100 mine cars from Irwin Mine Car Co.

E. I. duPont de Nemours & Co., Inc., has ordered two narrow-gage tank cars from General American Transportation Corpn.

Hooker Electro-Chemical Co., Niagara Falls, N. Y., has bought two 30-ton tank cars from General American Transportation Corpn.

Gulf, Mobile & Northern is dismantling 300 box, flat and gondola cars and 13 locomotives at Bogalusa, La.

Boston & Maine has arranged appropriation of $400,000 for repair program at shops at Concord, N. H., beginning in September, to include rebuilding 500 gondola cars and miscellaneous equipment.

Spot Straits Tin at 43.75c. a lb. —Lowest Offering Since June 7

Copper Retains Price Strength and Shipments Continue in Heavy Volume—Zinc in Moderate Demand—Lead Inactive

NEW YORK, Aug. 15.—With foreign prices slipping downward and consumers generally uninterested, the contrasting strength of domestic quotations is an excellent indication of the firm control first hands have on offerings together with the psychological support arising from the heavy volume of shipments. Quotations are steady at 9c. a lb., Connecticut Valley, despite limited resales made at shaded prices. Current demand is spotty and in low volume, and bookings range from spot delivery through October. Shipments last month approximated 58,000 tons as compared with 52,000 tons in June. In comparison, average monthly shipments during a normal year like 1927 totaled 70,000 tons. The volume of present releases indicates that August deliveries will outrun those of July. Interest is centered on the custom smelters' code recently offered at Washington. First hands intend to maintain intake at 20 per cent of operating capacity, which constitutes their only means of supporting a market which on several occasions has been jeopardized by independent producers and badly inflated stocks. If quotations are to exceed the proposed "weighted average cost," there is little doubt that the 9c. level will sharply advance.

Moderate movements were made in Europe late last week at 8.25c. a lb., c.i.f. usual European ports, but consumer demand eased off to a negligible level early this week. The ruling quotation today was nominally set at 8.15c.

Tin

Opening up last Wednesday at 44.65c. a lb., spot Straits followed sterling down, through the seven-day period, to today's level of 43.75c. The current quotation is therefore the optimum figure for Straits since the first days of June. Nevertheless the market remains virtually dead with transactions confined to the moderate daily demand for spot metal. Several placements of English refined were made late last week at 43.85c., and the market nominally closed today ¾c. under Straits. Large consumers have their immediate needs well covered, and, because of the steady price decline during the past three weeks, are withholding definite action in the hope that even lower prices will prevail when their requirements must be filled. In addition, London offerings may weaken if excessive outside metal appears, and the statistical uncertainty of pool releases continues to depress foreign consumer interest. Although July statistics were favorable, no reaction was evidenced in Europe. General demand is in very light volume. Offerings were made in London today at £214 10s. for spot standard and £214 for future standard. The Far East quotation dropped off to £220 2s. 6d. Deliveries of Straits into American consumption totaled 2297 tons as of Aug. 12 and United Kingdom warehouse stocks declined 425 tons, with the visible supply estimated at 19,105 tons at the end of last week.

Lead

Foreign prices continue to weaken, but domestic producers are maintaining prompt and September metal unchanged and firm at 4.50c. a lb., New York, and 4.35c., St. Louis. Several buyers have inquired for sizable tonnages in an effort to break present quotations, but first hands are rigidly holding their position. Shipments continue well ahead of contract schedules.

Zinc

Buying is at low ebb, but several large purchasers have had no success in forcing Prime Western below 5c. Smelters are booking limited tonnages of prompt metal at a steady level of 5.37c. a lb., New York, or 5c., East St. Louis. Unabated consumer pressure for deliveries is the main factor in holding the market at its present level. November bookings are in limited volume at 5c. With ore firmly established at $35, first hands maintain that conversion costs will force them to establish a 5.25c. level, if active purchasing reappears to support the advance. During July over 12,945 tons of Prime Western was sold for July delivery at a weighted average price of 4.824c. a lb., East St. Louis. During the same period over 17,926 tons was sold for August and September shipment, at an average price of 4.88c. Joplin ore remains unchanged at $35, and sales have improved. Miners have a firm grip on quotations, and with increased labor costs in the offing, will make a strong attempt to advance ore bids. During the past seven-day period Joplin sales increased 500 tons to 4950 tons and production rose to 5100 tons. Shipments totaled 5650 tons, which brought visible stocks down to 9700 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Aug. 9	Aug. 10	Aug. 11	Aug. 12	Aug. 14	Aug. 15
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, New York	9.00	9.00	9.00	9.00	9.00	9.00
Straits tin, Spot, N. Y.	44.65	44.80	44.60	....	44.12½	43.75
Zinc, East St. Louis	5.00	5.00	5.00	5.00	5.00	5.00
Zinc, New York	5.37	5.37	5.37	5.37	5.37	5.37
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 7.00c. a lb., New York.
Brass ingots, 85-5-5-5, 9c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	45.50c. to 46.50c.
Tin, bar	47.50c. to 48.50c.
Copper, Lake	10.50c. to 11.25c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	17.12½c.
*High brass sheets	14.75c.
*Seamless brass tubes	16.37½c.
*Seamless copper tubes	16.62½c.
*Brass rods	12.25c.
Zinc, slabs	6.25c. to 7.25c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.00c. to 8.00c.
Lead, sheets	8.25c.
Antimony, Asiatic	8.50c. to 9.50c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal commercial grade	25.00c. to 50.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	48.50c.
Tin, bar	50.50c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	10.00c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	52.50c.
Solder, ½ and ½	27.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.00c.	8.00c.
Copper, hvy. and wire	6.75c.	7.75c.
Copper, light and bottoms	5.75c.	6.25c.
Brass, heavy	3.75c.	4.50c.
Brass, light	3.50c.	3.75c.
Hvy. machine composition	5.25c.	6.00c.
No. 1 yel. brass turnings	5.00c.	5.625c.
No. 1 red brass or compos. turnings	5.00c.	5.50c.
Lead, heavy	3.625c.	4.00c.
Zinc	2.75c.	3.25c.
Cast aluminum	7.50c.	8.75c.
Sheet aluminum	12.00c.	13.50c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributors)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.i.f. Pacific ports	2.10c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.8155c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base. 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum). (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.95c.
Bars, f.o.b. Chicago	2c.
Bars, Cleveland	2c.
Bars, Buffalo	2c.
Bars, Detroit	2.15c.
Bars, eastern Michigan	2.20c.
Shafting, ground, f.o.b. mill, 1¼ in.	3.25c.
1-3/16 to 1½ in.	2.75c.
1-9/16 to 1¾ in.	2.60c.
1-15/16 to 2⅞ in.	2.45c.
2-15/16 to 6 in.	2.30c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

No. 10, f.o.b. Pittsburgh	1.65c.
No. 10, f.o.b. Chicago mill	1.75c.
No. 10, del'd Philadelphia	1.96c.
No. 10, f.o.b. Birmingham	1.80c.
No. 10, c.i.f. Pacific Coast ports	2.27½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Chicago mills	2.35c.
No. 24, del'd Philadelphia	2.56c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	2.90c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.95c.
No. 10 gage, f.o.b. Chicago mills	2.05c.
No. 10 gage, del'd Phila.	2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.40c.
No. 20 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.56c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.65c.
All widths up to 24 in., Chicago	1.75c.
Cooperage stock, Pittsburgh	1.75c.
Cooperage stock, Chicago	1.85c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.25c.
F.o.b. Cleveland	2.25c.
Del'd Chicago	2.55c.
F.o.b. Worcester	2.45c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

Extras of 10c. a 100 lb. on mixed carloads, 20c. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

	Base per Keg
Standard wire nails	$2.10
Smoothed coated nails	2.10
Galvanized nails	3.60

	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Woven wire fence, base column	55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	57	38½	¼ & ⅜	+11½	+21½
½	62	50½	½	31½	15
¾	65½	55½	¾	36½	20½
1 to 3	67½	58½	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	66½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	67½	57½	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	54½	41½	¼ & ⅜	+2½	+34½
½	60	51	½	32½	17½
¾	64½	55½	¾	37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 to 8	68	58	7 & 8	46	33
9 and 10	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	33	1½ in.	1
2½ in.—2¾ in.	40	1¾ in.	8
3 in.	47	2 in.—2¼ in.	13
3¼ in.—4½ in.	50	2½ in.—2¾ in.	16
4 in.	52	3 in.	17
4½ in. to 6 in.	42	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	41
1¼ to 1½ in.	53	3¼ to 3½ in.	44
1¾ in.	37	4 in.	46
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	50
2½ and 2¾ in.	40	4 in.	52
3 in.	47	4½, 5 and 6 in.	42

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel), f.o.b. mill	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ⅜-in. and smaller	2.40
Spikes, boat and barge	2.60
Tie plates, steel	1.90
Angle bars	2.55
Track bolts, to steam railroads	3.40
Track bolts, to jobbers, all sizes (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh, 72½, 25 and 10	
Stove bolts in packages, Ch'go, 72½, 25 and 10	
Stove bolts in packages, Cleveland, 72½, 25 and 10	
Stove bolts in bulk, P'gh	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.50
F.o.b. Chicago	2.60

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chi'o and Birm'g'm	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screw, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ¾ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	75

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in. inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in. inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in. inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in. inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Pig Iron, Ores, Ferroalloys

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$2.50 to $3.50
Foundry, f.o.b. Connellsville Prompt	2.75 to 4.50
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	8.26
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal (Nominal)

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$2.00 to $2.25
Mine run coking coal f.o.b. W. Pa.	2.00 to 2.50
Gas coal, ¾-in., f.o.b. Pa. mines	2.00 to 2.50
Mine run gas coal, f.o.b. Pa. mines	2.00 to 2.25
Steam slack, f.o.b. W. Pa. mines	85c. to 1.00
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.25

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.23c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.25c.
No. 4 industrial	5.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$43.40 to $44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	38.30
4-in., del'd New York	41.30
6-in., and larger, Birmingham,	$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00

Class "A" and gas pipe, $3 extra.

VALLEY

Per Gross ton f.o.b. Valley furnace:

Basic	$16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	16.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, copper free.	25.00
Silvery, sil. 8 per cent.	28.17
Bess. ferrosil'n, 15 per cent.	38.67

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.00
Del'd St. Louis	17.85
Malleable, f.o.b. Granite City	17.50
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	17.35

Freight rates, 83c (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'v'd eastern N. J.	$18.02 to $19.02
*Buffalo malleable, del'v'd eastern N. J.	18.52 to 19.52
East Pa. No. 2 fdy. del'v'd eastern N. J.	18.02 to 18.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

BUFFALO

Per gross ton, f.o.b. furnace:

*No 2 fdy.	$17.00
Malleable, sil. up to 2.25	17.50
Basic	15.00
Lake Superior charcoal, del'd	23.41

*Each increase of 25 points of silicon above base foundry grade takes 25c. extra.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$17.73
Tenn. fdy., sil. 1.75 to 2.25	17.73
N'th'n No. 2 foundry	$18.13 to 19.52
S'th'n Ohio silvery, 8%	25.14

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy.	$16.50
Malleable	16.50
Ohio silvery, 8 per cent.	26.25
Stand. low. phos., Valley	25.00
Southern No. 2 fdy.	17.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

*East. Pa. No. 2	$17.34
Basic (del'd east Pa.)	17.09
Malleable	17.84
Stand. low phos. (f.o.b. east. Pa. furnace)	$22.00 to $23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00

Prices, except as specified otherwise, are delv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

*Each increase of 25 points of silicon above base grade takes 25c. extra.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$13.00
Basic	13.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:

Mystic, sil. 1.75 to 2.25	$18.50
Buffalo, sil. 1.75 to 2.25	18.50
Ala., sil. 1.75 to 2.25	18.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carloads)	$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$21.25	12%	$28.25
7%	22.25	13%	29.75
8%	23.25	14%	31.25
9%	24.25	15%	32.75
10%	25.25	16%	34.25
11%	26.75	17%	35.75

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$26.25	14%	$32.25
11%	27.75	15%	33.75
12%	29.25	16%	35.25
13%	30.75	17%	36.75

Manganese 1½ to 3%. $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.65% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to 2.80
Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c.
Iron, low phos., Swedish, average 68½% iron	8.50c.
Iron, basic or foundry, Swedish, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 65% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	22c.
Manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 49-51%	21c.
Manganese, Brazilian, 46 to 48½%	17c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid*	$12.00
Tungsten, domestic scheelite*	$11.00 to $12.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$14.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.90
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.50 to $14.50
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	14.00 to 14.50
Scrap rails	14.00 to 14.50
Rails 3 ft. and under	15.50 to 16.00
Sheet bar crops, ordinary	14.50 to 15.00
Compressed sheet steel	13.00 to 13.50
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	12.00 to 12.50
Machine shop turnings	10.50 to 11.00
Short shov. steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Cast iron carwheels	13.00 to 13.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.50 to 12.00
Railr. knuckles and couplers	15.50 to 16.00
Rail, coil and leaf springs	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Low phos. billet crops	17.00 to 17.50
Low phos. sheet bar crops	15.50 to 16.00
Low phos. plate scrap	15.00 to 15.50
Low phos. punchings	15.50 to 16.00
Steel car axles	16.00 to 16.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.00 to $10.50
Shoveling steel	10.00 to 10.50
Hydraulic comp. sheets	$8.50 to $9.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.75 to 9.25
Rolled carwheels	11.50 to 12.00
Railroad tires	11.25 to 12.25
Railroad leaf springs	11.50 to 12.00
Axle turnings	8.50 to 9.00
Steel couplers and knuckles	11.00 to 11.50
Coil springs	11.75 to 12.25
Axle turnings (elec. fur.)	8.50 to 9.00
Low phos. punchings	12.00 to 12.50
Low phos. plates, 12 in. and under	12.00 to 12.50
Cast iron borings	6.50 to 7.00
Short shoveling turnings	6.50 to 7.00
Machine shop turnings	6.00 to 6.50
Rerolling rails	12.00 to 12.50
Steel rails, less than 3 ft.	11.75 to 12.25
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars steel	11.50 to 12.00
Cast iron carwheels	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	8.50 to 9.00

Per Net Ton	
Iron car axles	$12.50 to $13.00
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	9.00 to 9.50

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No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	4.75 to	5.25
No. 1 machinery cast	10.50 to	11.00
Clean automobile cast	10.00 to	10.50
No. 1 railroad cast	10.00 to	10.50
No. 1 agricultural cast	8.75 to	9.25
Stove plate	7.75 to	8.25
Grate bars	6.75 to	7.25
Brake shoes	9.75 to	10.25

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel		$12.00
No. 2 heavy melting steel	$10.00 to	10.50
No. 1 railroad wrought		12.00
Bundled sheets	8.50 to	9.00
Hydraulic compressed, new	10.50 to	11.00
Hydraulic compressed, old	8.50 to	9.00
Machine shop turnings		8.00
Heavy axle turnings	10.00 to	10.50
Cast borings		7.00
Heavy breakable cast	10.00 to	10.50
Stove plate (steel works)		9.50
No. 1 low phos. heavy		15.00
Couplers and knuckles		14.00
Rolled steel wheels		14.00
No. 1 blast furnace		7.00
Spec. iron and steel pipe	10.00 to	10.50
Shafting	15.00 to	15.50
Steel Axles	15.00 to	15.50
No. 1 forge fire		10.50
Cast iron carwheels	12.50 to	13.00
No. 1 cast	12.00 to	13.00
Cast borings (chem.)	10.00 to	10.50
Steel rails for rolling	12.00 to	12.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.00 to	$11.25
No. 2 heavy melting steel	10.50 to	10.75
Compressed sheet steel	10.00 to	10.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	10.00 to	10.50
Machine shop turnings	7.50 to	8.00
Short shoveling turnings	8.00 to	8.50
No. 1 busheling	10.00 to	10.50
Steel axle turnings	7.50 to	8.00
Low phos. billet crops	12.50 to	13.00
Cast iron borings	8.00 to	8.50
Mixed borings and short turnings	8.00 to	8.50
No. 2 busheling	8.00 to	8.25
No. 1 cast	11.00 to	11.50
Railroad grate bars	6.50 to	7.00
Stove plate	7.50 to	8.00
Rails under 3 ft.	10.00 to	10.50
Rails for rolling	10.50 to	11.00
Railroad malleable	10.00 to	10.50
Cast iron carwheels		11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.50 to	$11.00
No. 2 heavy melting scrap	10.00 to	10.50
Scrap rails	8.75 to	9.25
New hydraul. comp. sheets	10.00 to	10.50
Old hydraul. comp. sheets	9.50 to	10.00
Drop forge flashings	10.00 to	10.50
No. 1 busheling	10.00 to	10.50
Hvy. steel axle turnings	7.50 to	8.00
Machine shop turnings	6.25 to	6.50
Knuckles and couplers	11.50 to	12.00
Coil and leaf springs	11.50 to	12.00
Rolled steel wheels	11.50 to	12.00
Low phos. billet crops	12.50 to	13.00
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
No. 2 busheling	6.00 to	6.50
Steel car axles	11.00 to	12.00
Iron axles	11.00 to	12.00
No. 1 machinery cast	11.25 to	12.25
No. 1 cupola cast	11.00 to	12.00
Stove plate	8.75 to	9.25
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	9.00 to	9.50
Textrial malleable	11.50 to	12.00
Railroad malleable	12.00 to	12.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel		$11.00
Scrap steel rails		10.00
Short shoveling turnings		5.50
Stove plate	$7.00 to	7.50
Steel axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 railroad wrought	7.00 to	7.50
Rails for rolling		11.50
No. 1 cast		10.50
Tramcar wheels		10.00
Cast iron borings, chem.		8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.75 to	$10.25
No. 1 heavy melting	8.75 to	9.25
No. 2 heavy melting	8.25 to	8.75
No. 1 locomotive tires	7.50 to	8.00
Misc stand.-sec. rails	10.00 to	10.50
Railroad springs	10.00 to	10.50
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	8.75 to	9.25
No. 1 busheling	4.75 to	5.25
Cast iron borings and shoveling turnings	3.50 to	4.00
Rails for rolling	10.50 to	11.00
Machine shop turnings	3.50 to	4.00
Heavy turnings	4.75 to	5.25
Steel car axles	10.00 to	10.50
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	9.50 to	10.00
No. 1 railroad wrought	6.50 to	7.00
Steel rails less than 3 ft.	11.50 to	12.00
Steel angle bars	10.00 to	10.50
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	8.50 to	9.00
Railroad malleable	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Stove plate	7.00 to	7.50
Relay rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	6.00 to	6.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.25 to	$7.75
Scrap T rails	7.00 to	7.50
Machine shop turnings	4.25 to	4.50
Cast iron borings	4.25 to	4.50
Bundled skeleton, long	5.50 to	6.25
Forge flashings	4.75 to	5.00
Blast furnace scrap	4.75 to	5.00
Shafting	9.00 to	9.50
Steel car axles	8.50 to	9.00
Wrought pipe	3.50 to	4.00
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	10.00 to	10.50

Per gross ton delivered consumers' yards:

Textile cast	$10.00 to	$10.25
No. 1 machinery cast	10.00 to	10.25
Stove plate	6.25 to	6.50
Railroad malleable	11.00 to	12.00

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$8.00 to	$8.25
No. 2 heavy melting steel	6.75 to	7.00
Heavy melting steel (yard)	4.00 to	4.50
No. 1 heavy breakable cast	6.50 to	6.75
Stove plate (steel works)	5.25 to	6.00
Machine shop turnings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Cast borings	4.00 to	4.25
No. 1 blast furnace	4.00 to	4.25
Steel car axles	10.00 to	10.50
Spec. iron and steel pipe	$4.50 to	$5.00
Forge fire	5.50 to	6.00
No. 1 railroad wrought	6.50 to	7.00
No. 1 yard wrought, long	4.50 to	5.00
Rails for rolling	7.50 to	8.00
No. 1 cast	6.50 to	7.00
No. 2 cast	5.50 to	6.50
Stove plate (foundry)	6.00 to	6.50
Cast borings (chemical)	6.50 to	7.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$11.00
No. 1 hvy. cast (cupola size)	9.00
No 2 cast	7.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$9.50 to	$10.00
Scrap rails for melting	9.25 to	9.75
Loose sheet clippings	5.00 to	5.50
Bundled sheets	6.00 to	6.50
Cast iron borings	6.00 to	6.50
Machine shop turnings	5.50 to	6.00
No. 1 busheling	7.00 to	7.50
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.75 to	10.25
No. 1 locomotive tires	8.50 to	9.00
Short rails	11.50 to	12.00
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	9.50 to	10.00
No. 1 railroad cast	9.00 to	9.50
Burnt cast	7.00 to	7.50
Stove plate	7.00 to	7.50
Agricultural malleable	8.75 to	9.25
Railroad malleable	9.25 to	9.75

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$9.50 to	$10.00
Borings and short turnings	6.75 to	7.25
Long turnings	6.00 to	6.50
No. 1 machinery cast	8.50 to	9.00
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	9.50 to	10.00
Stove plate	5.75 to	6.25
New factory busheling	7.75 to	8.25
Old No. 2 busheling	5.75 to	6.25
Sheet clippings	6.25 to	6.75
Flashings	7.00 to	7.50
Low phos. plate scrap	10.25 to	10.75

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails, scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.50c.
Hot-rolled sheets (No. 10)	2.50c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list
Large rivets, base per 100 lb.	$3.25
Wire, black, soft ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.45
Cement coated nails, per keg	2.45

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.75c. to 1.90c.
Rail steel reinforcement	1.50c. to 1.65c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg lots)	3c.
Rivets, boiler (keg lots)	3c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap, or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.45
Com. wire nails, base per keg	2.55
Cement c't'd nails, base per keg	2.55

NEW YORK

	Base per Lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.10c.
Iron bars, swed. charcoal	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.70c.
Flats and squares	4.20c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.90
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
Black corrug. sheets (No. 24)	3.65c.
Galv. corrug. sheets	4.05c.
Structural rivets	3.00c.
Boiler rivets	3.00c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller, 100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.60c.
*Structural shapes	2.60c.
*Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.60c.
*Steel hoops	3.15c.
*Steel bands, No. 12 to 3/16 in., incl.	2.90c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.30c.
†Galvanized sheets (No. 24)	3.75c.
*Hot-rolled annealed sheets (No. 10)	2.75c.
Diam. pat. floor plates, ¼ in.	4.35c.
Swedish iron bars	6.00c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 2.35c.
Cold-fin. steel bars:	
Rounds, squares, hexagons	3.25c.
Flats	3.40c.
Flat rolled steel under ⅜ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinfore. bars	3.00c.
Rail steel reinfore. bars	3.00c.
Hoops	3.75c.
Bands	3.20c.
Cold-finished bars	3.32c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.15c.
Hot-rolled sheets (No. 10)	3.05c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.85
Chain, 1-in., per 100 lb.	3.80
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.13
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galv. sheets (No. 24)	4.00c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled unannealed sheets	3.10c.
Com. wire nails, base per keg	$2.15
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	2.60c.
*H beams and shapes	2.60c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	2.60c.
*Floor plates, diamond pattern	4.50c.
*Bar and bar shapes (mild steel)	2.50c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.50c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, half ovals, ovals and bevels	3.75c.
Tire steel, rd. edge 1½ x ½ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	2.45c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

Base prices for 40,000 lb. orders; extras apply for smaller quantities.

PACIFIC COAST

	Base per Lb.			
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	3.35c.	3.30c.	3.15c.
Shapes, standard	3.35c.	3.30c.	3.15c.
Wide-flanged beams and columns	3.45c.	3.45c.	3.50c.
Soft steel bars	3.35c.	3.30c.	3.15c.
*Reinforcing bars	2.90c.	3.00c.	3.15c.
Hot-rolled annealed sheets (No. 24)	4.15c.	4.05c.	4.50c.
Hot-rolled sheets (No. 10)	3.53c.	3.45c.	3.75c.
Galv. sheets (No. 24)	4.75c.	4.65c.	5.00c.
*Struc. rivets, ½ in. and larger	5.75c.	6.00c.	5.35c.
*Cold finished steel Rounds	5.85c.	5.85c.	5.75c.
Squares and hexagons	7.10c.	7.10c.	7.60c.
Flats	7.60c.	7.60c.	8.00c.
Common wire nails —base per keg	$2.65	$2.90	$2.75

*Subject to deductions for quantity.

Steel Employed for Airplane Merry-Go-Round

AN interesting adaptation of steel to the amusement field is afforded by the "pilot air," which is on the Midway at "A Century of Progress," Chicago. This device, which is really an airplane merry-go-round, was erected by Worden-Allen Co., Milwaukee, and makes use of 12 fabricated booms made of seamless steel tubing welded in place, and a turntable, mast and 12 struts that are constructed of standard steel shapes. Welding predominates throughout the job, though some joints are riveted. All field connections are bolted. Over 40 tons of steel was required, also air compressing equipment, air cylinders and electric motors and their controls.

At the center of the turntable is a mast to which snubbers and air hoists are attached. At 12 points on the rim of the turntable are struts which support booms by means of pin joints. A cable extends from a takeup in each boom to an air cylinder and each boom is fitted with a counterweight to compensate for the weight of the passenger in the plane which is attached by a two-way joint to the outer end of the boom.

After each car has a passenger, the attendant sets the counterweight adjustments and then starts the air compressor, thereby bringing all planes to a point about 6 ft. above the ground. Each plane is equipped with an electric motor which revolves the propeller. These motors are now started and the power derived from the propellers rotates the entire structure on the turntable base. This base is 24 ft. in diameter and the planes move in a circle 100 ft. in diameter and at a speed varying from 15 to 20 miles an hour.

Each plane has wings and a control stick so the rider can bank in either direction and zoom up or down as he desires. Each plane being independent of the others can move up to a height of 30 ft. and drop back to a height of 6 ft. above the ground. The rider has control of everything except his speed and direction of rotation. A spring device keeps tension on the cable in all positions of the see-saw motion of the boom.

Non-Ferrous Scrap Trade Organizes

Harry Braman, of Charles Braman & Son, Chicago, was elected president of the National Scrap Metal Dealers Association, at a meeting in that city Aug. 9. The association was recently formed to prepare a code for dealers in non-ferrous scrap metals, and chapters have already been formed in New York, New England, Philadelphia and other centers of the trade.

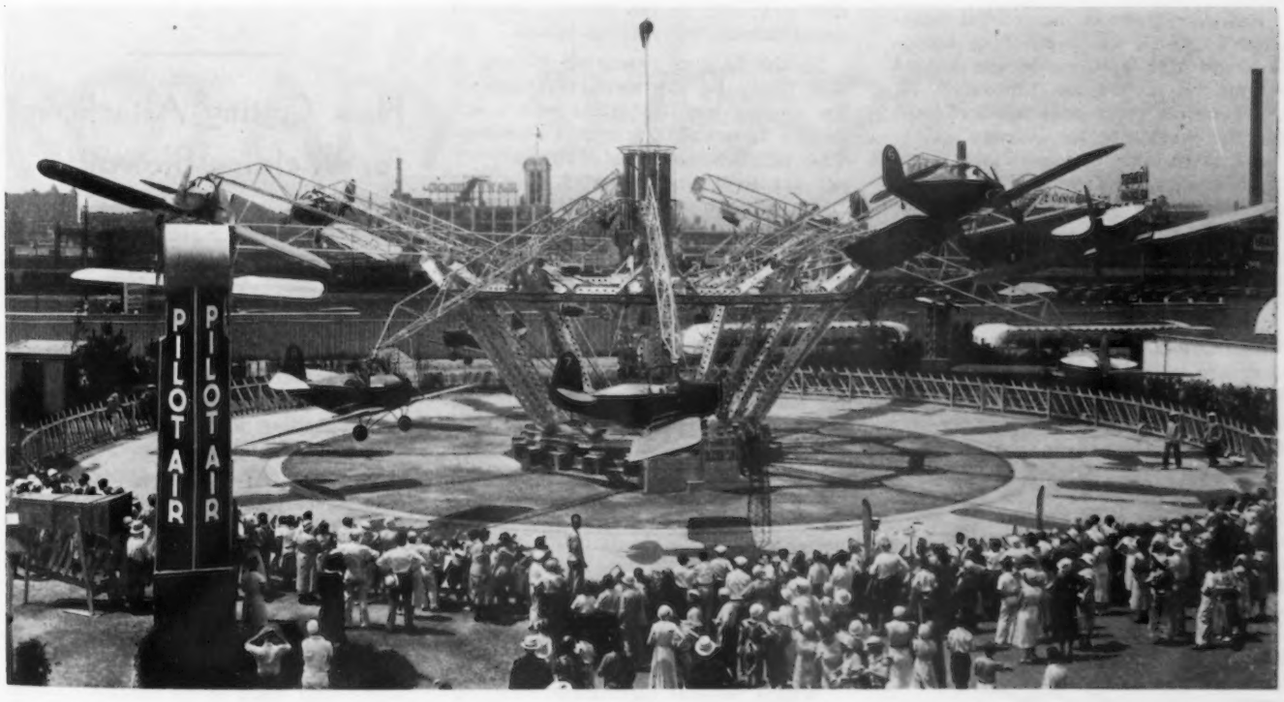
Other officers elected include: M. Goldfine, Western Metal Co., Chicago, vice-president; Morris Cohen, L. S. Cohen & Co., Chicago, secretary-treasurer.

The executive board, in addition to the officers, will consist of the following: A. Rotstein, Liberty Smelting & Refining Co., Chicago; W. Fienberg, Chicago Smelting & Refining Co., Chicago; M. Rolnick, Berkson Brothers Iron & Metal Co., Chicago; M. Patinken, Peoples Iron & Metal Co., Chicago; Wolf Cohen, L. S. Cohen & Co., Chicago; Samuel Mendel, Samuel Mendel & Brothers, Chicago; Sam Cohen, Cohen Brothers, Chicago, and Gilbert Cohen, Morris & Cohen, Chicago.

Pacific Iron Works Changes Hands

THE Pacific Iron Works, Inc., Portland, Ore., is being organized to take over the plant of the Pacific Iron Works, formerly owned and operated by O. E. Heinze, deceased. William Duthie has been elected president, and Leo Munson of Portland has been appointed plant manager. The Pacific Iron Works is a structural steel fabricating plant with a capacity of about 1000 tons per month. The main structure is 125 x 1000 ft. The plant is carrying an inventory of about 1500 tons, but expects to build it up to 3000 tons. The company fabricates buildings, bridges and similar structures. The plant is well equipped at present; a few additional tools will be added from time to time.

William Duthie is also president of Steel Fabricators, Inc., which has leased the structural steel plant of the Hofius Steel & Equipment Co., Seattle, which is equipped to handle about 1000 tons of work a month.



Each passenger can bank and zoom up or down at will. The picture shows planes at various heights according to the desires of the riders.

••• LETTERS TO THE EDITOR •••

(*Continued from Page* 28)

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say, 12 min., or a difference of 2 min. per fitting. Consequently these 2 min. were in excess of the standard and were charged against the job on an hourly rate, showing it in the red. Similar discrepancies were made in all other departments. Although 20 to 25 per cent was allowed for contingencies, the system was not sufficiently flexible for practical use in the steel foundry.

Another point to consider was the high cost of keeping this system in operation, as it called for a time study man for molding and core making, one for burning head and gates, one for grinders, chippers and welders and a man in the office to make new records and compute figures furnished by the time study man. Quite a burden!

JOHN SONNENFELD

Burnishing by Tumbling

Editor, The Iron Age:

We were naturally interested in George S. Brady's recent article "Reducing Polishing Costs by Tumbling,"* as we manufacture both the burnishing barrels and also the various types of steel burnishing shapes that are used.

As Mr. Brady pointed out early in his article, there are many variable factors in connection with cutting down or burnishing operations, and for this reason any disagreement regarding specific points that he brings up might easily be traced back to these variables.

However, there is one general statement to which we would take exception and this appears in the second column on p. 304, as follows: ". . . but generally two sizes are sufficient for the work of the average plant: the 3/32-in. size for small parts and the 5/16-in. size for larger parts." In actual practice 3/32-in. balls are seldom used alone as they do not have sufficient weight of themselves to bring up a bright color on metal surfaces in a reasonably short operating time. The 3/32-in. balls, when necessary for burnishing in angles, corners, or crevices, are usually supplemented by a larger size, such as ¼-in., in order that a good working pressure may be maintained.

The selection of steel burnishing balls or the assortment of balls and special shapes is based, not so much on the size of the individual part as on the contour or shape. On semi-fragile parts it is, of course, necessary to use a fairly light small ball. Just the opposite objection might be leveled against the use of 5/16-in. balls alone. The size of these balls eliminates their use as an individual medium except on parts that are fairly plain or have no sharp angles. If it were possible to name any assortment of parts that would serve the majority of purposes, we would be inclined to cast our vote for a mixture of ¼-in. balls and 3/16-in. cones or a mixture of ¼-in. balls and ⅛-in. balls.

Our reason for commenting on Mr. Brady's article was that it seemed to us that manufacturers might easily get the impression that 3/32-in. and 5/16-in. balls might be considered somewhat in the nature of a panacea for all burnishing evils. As a matter of fact, there are dozens of combinations in use today to burnish satisfactorily the wide variety of articles that are now being finished by this economical method.

J. H. DONAHUE,
Sales Manager, The Abbott Ball Co.

*THE IRON AGE, Feb. 23, 1933, page 303.

Uncle Sam as a Price Cutter

Editor, The Iron Age:

Now that the Administration at Washington pledges to put an end to various cut-throat methods employed in business, and promises, if necessary, to use the authority vested in it by the National Industrial Recovery Act, it will be interesting to note whether or not the authorities will make use of the mass of valuable data now available in the files of its own departmental purchasing offices.

In the face of changing events, it will likely be considered unpatriotic for one to buy materials which are known to emanate from a sweatshop. The administrators of the recovery act are expecting industry to either weed out these unscrupulous ones themselves, or turn their names over to the proper authorities who will, no doubt, by more persuasive coercion, bring them into line with legitimate practice.

Many of the Government buying agencies have been capital offenders in encouraging (unintentionally of course) the lowering of wages and selling prices. Their routine of buying has been an incentive for certain manufacturers to force labor down to an unprecedented level in order to get under a competitor's quotation. Where a number of quotations are involved, the order invariably has been placed with one of the lowest bidders and in many instances at a loss to the one making the bid.

Where several quotations covering a given item are received by one of these offices and the prices vary to a considerable degree, which they usually do, it can be readily ascertained which bidders are to be placed among the price-cutter class.

As an example: in a certain U. S. engineering district, quotations are asked for a quantity of iron or steel castings. When the bids are opened the individual prices quoted vary from $2.10 to $8 per 100 lb., delivered to buyer. Several local foundries, who probably are paying a fair and regularly established wage, would quote within a close margin of one another. Others not locally situated, and considering the freight charges involved, would quote about the same or possibly higher than the local bidders. But in nearly every instance there will be found a certain number, and some of them located several hundred miles distant, who quote ridiculously low prices compared to the average. It is evident that these manufacturers must be paying an exceptionally low or, as we might say, a starvation wage.

One knowing his foundry costs can immediately detect from the pig iron price for the respective district, and allowing for the variation in overhead, that some of these low bidders must be working their men for 10 or 15 cents an hour. Otherwise they feel so ultra-patriotic that they are willing to donate to the buyer, which is most unlikely.

Therefore, if the Government really wants to seek out some of the so-called price cutters and low wage payers, they have only to resort to the files of their various purchasing departments, where much information can be found that would be otherwise unobtainable.

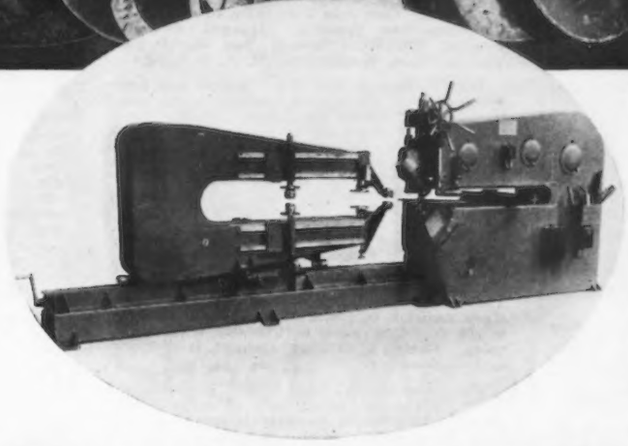
A FOUNDRYMAN.

New Cutting Attachment for Welding Blowpipe

AN improvement in the Oxweld type CW-17 cutting attachment, whereby the heating oxygen throttle can also be used as an oxygen shut-off valve for use during temporary stops in cutting, has been announced by the Linde Air Products Co., 30 East Forty-second Street, New York. The throttle has been redesigned and the valve packing improved to make the valve operate more easily.

The type CW-17 cutting attachment was developed to provide a general blowpipe suitable for all kinds of work. By simply unscrewing the head of an Oxweld Type W-17 welding blowpipe and screwing on the CW-17 cutting attachment, the blowpipe can be used for cutting as well as welding. The attachment is sufficiently small and light to be carried around in the operator's pocket.

SOMETHING NEW



in

ROTARY SHEARS

Features

Arc Welded Construction
Geared-Head Motors
Anti-Friction Bearings Throughout
Pressure Grease Lubrication
Feeds: 12, 24, 36, 72 ft. per min.
Shears 5/16" Mild Steel
Flanges ¼" Mild Steel or No. 10 Gauge Alloy Steel
Makes Straight or Irregular Cuts
Cuts Square or Beveled Edges
Slits Strips and Wide Sheets

Quickwork presents to the sheet and plate fabricating trade a new rotary shear of outstanding merit—here illustrated with elliptical attachment. Unlike its predecessors it is of arc welded plate construction powered with geared-head motors.

The new construction of the No. 230 possesses, in addition to great strength and rigidity, the added advantage of wide latitude in design. Specifically, its frame design may be modified to meet exactly your requirements *at minimum cost* as to throat depth, speeds, size of cutters, position of cutter shafts, etc. In other words, it has been freed from the limitations imposed by the fixed design of cast frames. The No. 230 is guaranteed against breakage under specified usage.

With the elliptical attachment the No. 230 shear will cut and flange circular blanks from 12" to 84" diameter. It will also cut and flange elliptical blanks struck from four centers: minimum 42" x 34", maximum 84" x 54". This elliptical attachment eliminates manual guiding of blanks, and produces them uniformly which otherwise would require large presses and costly dies.

The line of Quickwork cast-frame rotary shears which have established a reputation for 22 years will be continued. Wherever one of the cast-frame shears does not exactly meet a customer's needs, we are prepared to meet those needs precisely with the No. 230 series of welded construction shears. May we send you further information?

THE QUICKWORK COMPANY *(H. Collier Smith, Jr., President)* ST. MARYS, OHIO

"QUICKWORK"

(REGISTERED IN U.S.A. AND FOREIGN COUNTRIES)

EQUIPMENT FOR STRAIGHT, IRREGULAR, CIRCULAR AND ELLIPTICAL CUTTING, BEVELING AND FLANGING OPERATIONS
CABLEGRAMS "QUICKWORK" ALL CODES

PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

New Haven Brewing Co., New Haven, Conn., recently organized by E. A. Carroll, 41 Savoy Street, Hamden, Conn., and associates, capital $200,000, has taken over former plant of Yale Brewing Co., and will make extensions and improvements, including additional equipment. New company will be associated with Christian Feigenspan Corpn., 50 Freeman Street, Newark, N. J., brewer.

Saco-Lowell Shops, Smith Street, Biddeford, Me., manufacturer of textile machinery and parts, has plans for new one-story foundry. Cost about $25,000 with equipment.

Swan Tool & Machine Co., Hartford, Conn., has been organized by F. W. Wennerberg and Albin Swahn, 62 Foley Street, and associates, to manufacture tools and machinery.

Department of Commerce, Second Lighthouse District, 37 Marginal Street, Chelsea, Mass., plans early call for bids for new one-story forge and blacksmith shop. C. H. Robinson, address noted, is engineer.

Constantine Mfg. Co., Providence, R. I., has been organized by Maurice Constantine, 100 Stewart Street, and associates, to manufacture metal plated novelties, jewelry specialties, etc.

Board of Water Commissioners, Swansea, Mass., plans installation of pumping machinery, pipe lines, etc., for new water supply system. Cost about $125,000 with equipment. Metcalf & Eddy, Statler Building, Boston, are consulting engineers.

NORTH ATLANTIC

Berst-Forster-Dixfield Co., 420 Lexington Avenue, New York, manufacturer of pulp and wood products, heavy paper stocks, etc., has let general contract to James Leck Co., 211 South Eleventh Street, Minneapolis, for two-story addition, 165 x 165 ft., to plant of Standard Pulp Products Co., Plattsburg, N. Y., an affiliated organization. Cost about $100,000 with equipment. Homan F. Hallock, Oswego, N. Y., is architect and engineer.

Metropolis Brewing Co., Pelham Heights, Pelham, N. Y., plans extensions and improvements, to include additional equipment. Cost close to $70,000 with machinery.

North Method Clip Supply Co., Inc., New York, has been organized by David A. North, 43 Springhill Avenue, West Brighton, S. I., and William B. North, 332 North Maple Avenue, East Orange, N. J., to manufacture metal and iron roofing clips and kindred specialties.

New York Central Railroad Co., New York, is increasing operations at 16 main line locomotive, freight car and passenger car shops, adding to working quotas more than 1400 men, making a total of 7825 men at these shops.

George F. Driscoll Co., 548 Union Street, Brooklyn, general building contractor, has purchased former plant of Buckingham Steel Co., Inc., 5702-18 Second Avenue, with buildings on site, 100 x 125 ft., and will improve for general shops, equipment repair, storage and distributing service.

Department of Labor, Bureau of Immigration, Washington, has secured appropriation of $1,172,000 for extensions and improvements in buildings and utilities at Ellis Island, N. Y., including power house work, pipe lines for heating, plumbing, etc., plumbing equipment and fittings, ventilation system, water softeners, submarine cable line and other work, costing about $250,000 of amount noted.

Zenith Razor Blade Corpn., New York, has been organized by Harry Orner, 106 Lewis Street, and associates, to manufacture steel razor blades and kindred products.

Titanium Pigment Co., 60 John Street, New York, affiliated with National Lead Co., 111 Broadway, has purchased former local plant and property of American Salpa Corpn., Spotswood, N. J., defunct, held by municipality, comprising 64 acres and group of buildings. New owner will improve for new main plant, and will add to present buildings. Cost over $600,000 with equipment.

Goldstein Iron Works, Inc., Bronx, New York, has been organized by Bernard Goldstein, 610 East 135th Street, and associates, to manufacture iron and other metal products.

Constructing Quartermaster, Fort Hamilton, N. Y., has secured appropriation of $51,523 for extensions and improvements in water, sewer and electrical systems, including pipe lines, wharf, etc., and will ask bids soon.

Constructing Quartermaster, Fort Jay, N. Y., will secure appropriation of $134,430 for extensions and improvements in water system, pipe lines, etc., and wharf. Early call for bids is planned.

Hoffman Beverage Co., 402 Grove Street, Newark, N. J., has acquired adjoining property as site for new seven-story brewing plant, totaling more than 100,000 sq. ft. floor space. Cost over $750,000 with equipment. Completion is scheduled by end of year.

Orange Mfg. Corpn., Newark, N. J., has been organized by Thomas M. Searles and Charles L. Fessenden, 63 Hoyt Street, and associates, to manufacture cans, containers, etc.

Harrison Beverage Co., 500 Harrison Avenue, Harrison, N. J., has plans for two-story and basement addition, including alterations and improvements in one-story brewery unit. Kolb & Miller, 31 Union Square, New York, are architects and engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 22 for 300 aircraft altimeters (Schedule 509), 800 engine cylinder thermometer thermocouples, 670 leads for thermocouples, 200 engine thermometer indicators, etc. (Schedule 495); 1730 non-magnetic type aircraft tachometer shafts (Schedule 491) for Philadelphia Navy Yard.

Kuebler Brewing Co., Inc., Easton, Pa., recently organized to take over former brewery of W. Kuebler's Sons, has approved plans for expansion and improvements, including new equipment. Cost over $100,000 with machinery. Company has recently arranged financing totaling $900,000. Harold Van Syckle, 509 Tisdale Place, Woodbridge, N. J., is head.

John F. Betz & Son, Inc., Willow and Lawrence Streets, Philadelphia, recently organized to take over former brewery at location noted, has arranged financing in amount of $700,000, part of fund to be used for remodeling and expanding plant. Cost close to $100,000 with equipment. Clarence E. Wunder, Architects' Building, is architect.

BUFFALO DISTRICT

Diamond Match Co., 30 Church Street, New York, will soon begin superstructure for two-story addition to plant at Oswego, N. Y., 160 x 165 ft. Cost close to $100,000 with equipment. Homan F. Hallock, Oswego, is architect and engineer.

Art Stone Corpn., Edna Street, Lackawanna, N. Y., plans rebuilding part of stone-cutting and finishing works recently destroyed by fire. Loss about $35,000 with equipment.

Ryan Brewing Co., Inc., Syracuse, N. Y., recently organized, Eugene D. Lichtenberg, Hills Building, representative, has filed notice of increase in capital from $20,000 to $500,000 for expansion.

Sturgis Mfg. Co., Inc., Rochester, N. Y., has been organized by Donald and Charles E. Sturgis, 35 Lewiston Avenue, to manufacture tools, implements and kindred products.

WASHINGTON DISTRICT

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Aug. 21, 22, and 24 for automobile and motor truck parts (Circulars 11, 12 and 13, respectively); until Aug. 22 for fire extinguishers (Circular 14).

James Posey, Baltimore Trust Building, Baltimore, consulting engineer, will draw plans for new one and two-story distilling plant for company whose name is temporarily withheld. Cost over $65,000 with equipment.

Department of Interior, Washington, has secured appropriation of $460,000 for new steam-electric power plant at Howard University. Early call for bids is planned.

General Purchasing Officer, Panama Canal, Washington, asks bids until Aug. 23 for one gasoline-driven marine-type engine, shovels, spades, crosscut saws, chisels, tinner's snips, twist drills, bolt dies, machine screws, chain links, coil chain, etc. (Schedule 2894); until Aug. 24, electric motors, transformers, magnetic switches, panelboards, etc., 73,500 ft. rigid steel conduit, 30,000 ft. copper wire cloth, 100,000 ft. solid copper wire, 5000 sq. ft. steel wire cloth, cast manganese steel gears, split gears, bevel gears and other equipment (Schedule 2892).

C. A. Mowry, Norfolk, Va., is at head of project to establish local brewery, and will remodel property acquired on line of Norfolk & Western Railroad. Cost over $80,000 with equipment. Company will be organized to carry out work.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 22 for cold drawn seamless steel tubing (Schedule 539), brass and copper pipe and tubing (Schedule 538-R) for Portsmouth, N. H., Navy Yard; 54,000 lb. steel forgings for Boston, Brooklyn, Philadelphia and Puget Sound yards (Schedule 506).

SOUTH ATLANTIC

Tropical Brewery, Inc., Miami, Fla., Van C. Swearingen, president, recently organized, has taken over property at 21 N. W. Fifty-eighth Court, and will remodel for plant. Cost over $75,000 with machinery. G. LeRoy Kinports, 3897 Kumquat Avenue, is architect.

Norman Auto Parts, Inc., Asheville, N. C., has been organized by J. Norman, Asheville, and associates, capital $100,000, to manufacture automobile parts and equipment.

Constructing Quartermaster, Pope Field, N. C., is securing appropriation of $115,000 for new hangar, with repair and reconditioning shops, sprinkler system, etc., and plans call for bids soon.

Common Council, Hapeville, Ga., plans municipal electric light and power plant, extensions in water supply and sewer systems, with installation of pumping machinery, pipe lines, etc. Cost about $150,000 with equipment.

Tubize Chatillon Corpn., 2 Park Avenue, New York, let general contract to Fiske-Carter Construction Co., Greenville, S. C., for additions to cellulose rayon mills, Rome, Ga., including units for viscose preparation, pulp storage and distribution, extensions in power plant and other structures. Cost over $1,000,000 with equipment. J. E. Sirrine & Co., Greenville, are architects and engineers.

WESTERN PENNA.

Continental Can Co., Inc., 1 Pershing Square, New York, has taken over can-manufacturing branch of Manion Steel Barrel Co., Rouseville, Pa., and will occupy under lease unit heretofore used by Manion company for such division, expanding output for manufacture of motor oil cans and allied containers. Manion company will continue manufacture of steel drums, barrels, etc.; it is a division of Rouseville Cooperage Co., Rouseville.

American Brewing Co., Inc., Parkersburg, W. Va., recently organized by E. C. Epple, George and Depot Streets, and associates, capital $150,000, has taken over a factory building on line of Baltimore & Ohio Railroad, and will remodel for plant. Cost over $70,000 with machinery. F. H. Leidecker, Parkersburg, is interested in new company.

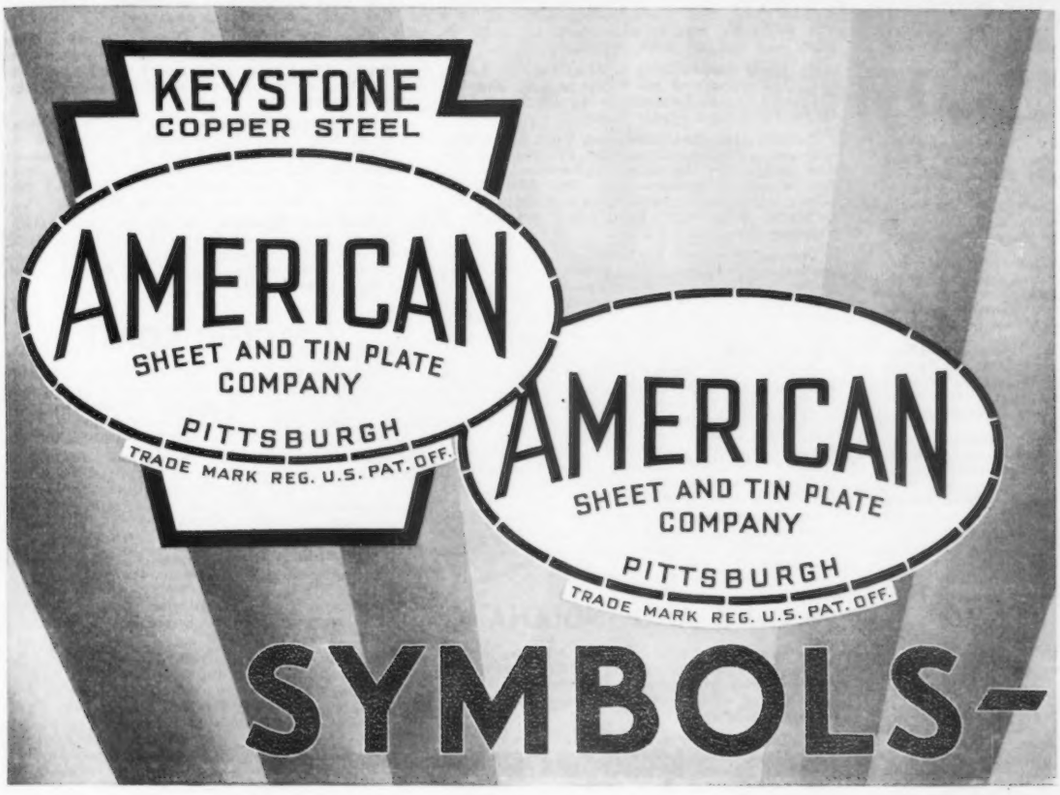
International Harvester Co., 606 South Michigan Avenue, Chicago, has leased one-story building to be erected at Center Avenue and Millvale Street, Pittsburgh, for branch for motor truck manufacturing division. General erection contract let to Kerr & Ingram, 101 Seventh Avenue, Pittsburgh.

SOUTH CENTRAL

Tennessee Valley Authority, Department of Interior Building, Washington, has authorized plans for steel tower tie-in transmission line, 220 miles long, from Wilson Dam, Muscle Shoals, Ala., to proposed new Cove Creek hydroelectric power project of Government on Clinch River, about 20 miles from Knoxville, Tenn. Line construction with power switching and substations will be carried out preliminary to power development program, for which a fund of $35,000,000 will be available. Lewellyn Evans, Muscle Shoals, is consulting electrical engineer for Authority.

Southern States Breweries, Inc., Atlanta, Ga., C. S. Barrett, 1004 Healey Building, president, recently organized, capital $1,000,000, plans new multi-unit brewing plant at Knoxville, Tenn. Cost about $350,000 with equipment. Another plant is projected in Georgia to cost close to like sum.

AMERICAN



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GENERAL EXHIBITS BUILDING—A CENTURY OF PROGRESS EXPOSITION

Brown-Forman Co., 1908 Howard Street, Louisville, plans additions to distilling plant, including improvements in present units. Cost about $100,000 with equipment. L. V. Abbott, 8 Kenwood Village, city, is architect.

Cameo-Elkhorn Coal Co., Big Shoal, Ky., has taken over Joseph Hatcher coal properties and plans development and expansion, to include new equipment. Roy Crawford is construction engineer.

Southern Car & Mfg. Co., 400 South Seventh Street, Birmingham, plans rebuilding part of plant recently destroyed by fire.

American Glanzstoff Corpn., Elizabethton, Tenn., manufacturer of cellulose rayon products, is considering extensions and improvements. Cost more than $500,000 with equipment.

MIDDLE WEST

South Side Brewing Co., Chicago, recently organized, has taken over former Jung Brewery, 3700 South Halsted Street, and will modernize for new plant. Cost over $100,000 with equipment. Incorporators of company include Frank C. McNicholas and Frank P. Decker. Joseph Bednarek is company architect.

Kaplan Envelope Co., Rockford, Ill., has leased factory at 2533 North Ashland Avenue, Chicago, about 22,000 sq. ft. floor space, for new paper converting plant, removing works from Rockford and increasing capacity.

Schatzbrau Brewing Co., Melrose, Minn., plans extensions and improvements, including additional equipment. Cost about $100,000 with machinery. L. F. Schafhausen, 1024 West Fifty-third Street, Minneapolis, is architect.

William M. Hardin, president, Colonial Warehouse, Inc., 218 Third Avenue North, Minneapolis, is at head of project to establish new brewery at Winona, Minn. Property has been acquired, and extensions and improvements will be made, including equipment. Cost about $125,000 with machinery. Company will be organized to carry out work. John Ditz, Jordan, Minn., is interested in project.

Common Council, Grundy Center, Iowa, plans municipal electric light and power plant, and will soon call for bids. Cost about $120,000 with equipment. H. L. Cory Co., Baum Building, Omaha, Neb., is consulting engineer.

Common Council, Cedar Falls, Iowa, is planning installation of new coal-handling machinery and storage equipment at municipal electric light and power plant. C. H. Streeter is city engineer in charge.

Key City Brewing Co., 136-46 Main Street, Dubuque, Iowa, has approved plans for extensions and improvements, including additional equipment. Cost about $35,000 with machinery.

F. R. Steiner Mfg. Co., Inc., 2300 North Oak Park Avenue, Chicago, has been organized by Frank R. Steiner and associates, to manufacture plumbing equipment and supplies.

Pillsbury Flour Mills Co., Metropolitan Life Building, Minneapolis, has let general contract to Jones-Hettelsater Construction Co., Mutual Building, Kansas City, Mo., for addition to grain storage elevator plant at Springfield, Ill. Cost about $200,000 with processing, weighing, conveying, loading and other equipment.

Supreme Steel Treating Co., Milwaukee, has been organized by Harvey Semrow, A. L. Friday and Casper Grill and is establishing new shop at 119-123 West Scott Street, specializing in tool steel and die hardening and also doing gear, shaft and similar work.

City Council, Beaver Dam, Wis., has engaged Jerry Donohue Engineering Co., Sheboygan, Wis., to design and supervise construction of new sewage disposal plant. Cost $60,000.

Hagemeister Brewing Co., Green Bay, Wis., has been incorporated by Henry F. and Karl Hagemeister and John Rose and will rehabilitate former Hagemeister brewery at cost of $125,000.

City Commission, Fort Atkinson, Wis., A. J. Koenig, manager, is asking bids until Aug. 22 for erection and equipment of new sewage disposal plant to cost $60,000. Robert Cramer, 647 West Virginia Street, Milwaukee, is consulting engineer.

SOUTHWEST

American Railway Coach & Equipment Co., Kansas City, Mo., recently organized by O. W. Gibson, 1118 R. A. Long Building, and associates, to manufacture railway equipment, parts, etc., plans new one-story plant.

Fox Creek Distilleries, Inc., St. Louis, care of Alfred E. Davis, Clayton, Mo., head, recently organized, has selected site at Southwest Avenue and line of Frisco Railroad for new multi-unit plant, to include boiler plant, machine shop and other structures. Cost about $100,000 with equipment.

Gast Brewery, Inc., Broadway and Hornsby Avenue, St. Louis, has plans for extensions and improvements, including new brew-house, mechanical-cooling plant, engine house and other structures. Cost about $85,000 with equipment. George E. Wells, Inc., Security Building, is engineer.

Hauber Cooperage Co., Seventeenth Street and Osage Avenue, Kansas City, Kan., manufacturer of wire-bound kegs, barrels, etc., has let general contract to J. H. Young & Sons Construction Co., 214 East Linwood Boulevard, Kansas City, Mo., for one-story addition, 90 x 220 ft., with lean-to extension, 12 x 90 ft. Cost over $25,000 with equipment.

St. Louis Shipbuilding & Steel Co., St. Louis, has been organized by Ethan A. H. Shepley, Clayton, Mo., and associates, to operate a local shipbuilding and repair plant.

Constructing Quartermaster, Fort Sill, Okla., will secure appropriations of $96,000 for two new gun sheds, including equipment; $45,000 for telephone construction; and $45,000 for new quartermaster equipment storage and distributing building. Early call for bids is planned.

Common Council, Big Sandy, Tex., plans installation of pumping machinery and other mechanical equipment, pipe lines, etc., for municipal waterworks and sewage system. Cost about $60,000. Hawley, Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

Public Works Administrator, Department of Interior Building, Washington, will soon authorize plans for new hydroelectric power and flood control project on Red River, near Denison, Tex., including power dam, 11,000 ft. long and 160 ft. high, with generating station, transmission lines, power substations, switching stations and other structures. Fund of $36,500,000 will be available.

Common Council, Zapata, Tex., plans municipal electric light and power plant. Cost about $30,000 with equipment. Financing is being arranged.

OHIO AND INDIANA

Murath, Inc., 3139 Croton Avenue, S. E. Cleveland, manufacturer of welding equipment and supplies, has leased a two-story factory at 7309 Union Avenue, S. E., for new plant to increase production.

Western Reserve Brewing Co., Warren, Ohio, P. J. Corll, head, has taken over former plant of Ward Baking Co., Youngstown Road, and will remodel for new brewery. Cost over $200,000 with equipment. Braziell & Anderson, 309 Fourth Avenue, Pittsburgh, are architects.

Department of Public Service, Cuyahoga Falls, Ohio, is planning installation of electric generators and other equipment for municipal electric light and power plant. Cost about $300,000. Financing is being arranged. C. Bell, City Hall, is city engineer.

Franklin Brewing Co., Columbus, Ohio, John Unvergazt, 440 South Eighteenth Street, president, has plans for new plant at Spring and Hocking Streets. Cost over $250,000 with equipment. M. J. Mulligan, 498 Hutton Place, is architect.

Hall Mfg. Co., 1602 Woodland Avenue, Toledo, Ohio, manufacturer of automotive equipment, has secured contract from Ford Motor Co., Dearborn, Mich., for installation of new eccentric valve seat grinding machine in every service station of company, totaling over $850,000.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Aug. 23 for 100 engine ring cowling assemblies (Circular 19), 16 bombing trainer target truck assemblies, 16 bombing trainer target box assemblies, and 16 bombing trainer target front-wheel assemblies (Circular 29); until Aug. 30, fire extinguishers complete with brackets (Circular 28).

McFadden Foundry, Columbiana, Ohio, has been leased from Charles Frederick, owner, by new interests, and will soon be reopened after shut down for about four years. Plant will be improved for production of special steel castings.

Old Vincennes Brewery, Inc., Vincennes, Ind., G. L. Shepard, president, has let general contract to George E. Wells, Inc., Security Building, St. Louis, engineer, for extensions and improvements. New equipment will be installed. Cost about $150,000 with machinery. M. F. Strauch, 3863 Lincoln Avenue, Chicago, is architect.

Royal Battery Mfg. Co., Indianapolis, recently organized, has leased factory at 912 Pierson Street for manufacture of automobile storage batteries and kindred automotive products. John Gollehon is president.

MICHIGAN DISTRICT

Cadillac Brewing Co., Shoemaker Avenue, Detroit, will soon take bids for new nine-story and basement plant, with two-story office adjoining. Cost about $400,000 with equipment. Company was chartered recently by Fred C. Sebulske, 1173 Nottingham Road, Grosse Pointe Park, and associates. G. A. Mueller, 1346 Broadway, is architect.

H. W. Rickel & Co., 1824 Adelaide Street, Detroit, have taken bids on general contract for two additions to brewing plant, each two-stories, 60 x 78 ft., and 30 x 60 ft., respectively. Cost over $45,000 with equipment. Charles A. Cahill, Jr., is company engineer.

American Humidaire Corpn., Grand Rapids, Mich., has been organized by Dr. Ferris N. Smith, Wealthy and Plymouth Streets, and associates, to manufacture air-conditioning equipment, parts, etc.

Michigan Talc Mining Co., 2970 West Grand Boulevard, Detroit, recently organized by Walter J. McCoy, 1605 Lee Place, and associates, capital $150,000, has taken over large talc deposit under lease, and will install new mining, grinding and finishing plant.

Food City Brewing Co., Battle Creek, Mich., has let general contract to R. G. Phelps, Battle Creek, for one-story addition. Cost about $50,000 with equipment. L. J. Sarvis, Battle Creek, is architect.

PACIFIC COAST

Mueller Co., 2468 Hunter Street, Los Angeles, manufacturer of plumbing equipment and supplies, has let general contract to Austin Co. of California, for one-story foundry, 150 x 190 ft. Cost about $40,000 with equipment.

Gilmore Oil Co., Third and Eighteenth Streets, San Francisco, is planning new bulk oil storage and distributing plants at Eureka, Redding and Ukiah, Cal., each with steel storage tanks, pumping plants and other structures. Total cost about $65,000 with equipment.

Suter Gas & Diesel Engine Co., Los Angeles, has been organized under direction of Walter J. Little, W. M. Garland Building, by John H. Suter and Harry H. Hillman, capital $100,000, to manufacture Diesel engines and parts and other power equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 22 for two motor-driven lathes, 14-in., with 6-ft. bed (Schedule 516) for San Pedro Navy Yard; 390,400 lb. cold rolled sheet steel (Schedule 494), pneumatic tool hose (Schedule 479), 200 pneumatic scaling hammers (Schedule 480), 5000 lb. 3½-in. and 4600 lb. 4-in. corrosion-resisting bar steel (Schedule 485), 3000 lb. 1⅞-in. and 5000 lb. 2¼-in. naval rolled bar brass (Schedule 483) for Mare Island yard.

Spokane Brewing & Malting Co., West 901 Broadway, Spokane, Wash., is arranging financing for $150,000, part of fund to be used for addition, including improvements in present plant. Cost close to $100,000 with equipment. G. A. Pehrson, Old National Bank Building, is architect.

Idaho Power Co., Boise, Idaho, will build new high-tension transmission line from Jarbridge, Nev., to Mountain City, Nev., about 30 miles, for service at mines and mill of Mountain City mining Co., Mountain City, a subsidiary of Anaconda Copper Mining Co., New York.

Samarkand Brewing Co., 893 Folsom Street, San Francisco, will soon begin superstructure for new plant at Oakland, Cal. Cost about $250,000 with equipment. Company was organized recently by J. P. Rettenmayer and Paul L. Schmidt. O'Brien Brothers and W. D. Peugh, 333 Montgomery Street, San Francisco, are architects.

Radex Soap Co., Tacoma, Wash., V. W. Greer, manager, plans factory at Puyallup, Wash. Cost close to $50,000 with equipment.

FOREIGN

Ministry of Communications, Government of Persia, Teheran, Persia, has secured appropriation of 175,000,000 rials (about $8,750,000) for extensions and improvements in Government railroads for fiscal year ending March, 1934, including new lines, engine houses with shop and repair facilities, equipment, rolling stock, etc.

Soviet Russian Government, Moscow, plans purchase of tools and equipment for different industries, totaling about $75,000,000, of which large part will be selected in United States, including rolling mill machinery to cost close to $9,000,000, machine tools, bench tools, hand tools, and special heavy and light machinery. Soviet Union is sending technicians to this country to assist in making purchases. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

BREWERIES

A MARKET FOR TONCAN IRON

Metal jobbers and equipment manufacturers are finding the brewing industry a live market for Toncan Iron in many forms—sheets, plates, pipe and boiler tubes.

Old plants are being modernized. New plants are under construction. And the demand for Toncan Iron is based on past experience that this modern alloy of refined iron, copper and molybdenum grows old slowly, because it possesses a rust resistance surpassed among the ferrous metals only by the stainless alloys.

The applications of Toncan Iron Sheets are legion—roofing, siding, eaves troughs, conductors, vats, tanks, pasteurizing and steaming trays, pails, truck bodies and grain chutes. In several of the large Milwaukee breweries a large tonnage of Toncan Iron Sheets is being used in malt houses for blow pipe construction and for ventilating applications in refrigerating systems. Toncan Iron Plates find service in brine tanks, condenser shells, boilers and stacks. Toncan Iron Pipe and Boiler Tubes are specified by many brewery engineers. And Toncan Galvannealed is already in use in thousands of signs heralding to a thirsty public the return of the legalized brew.

With $400,000,000 estimated to be spent in the near future by the brewing industry, there can be no uncertainty about the fact that there already exists a real market for the sale of Toncan Iron. Your share will depend on your ability to fill the needs of the industry.

TONCAN
COPPER MOLYB-DENUM
IRON

REPUBLIC STEEL CORPORATION
GENERAL OFFICES YOUNGSTOWN, OHIO

Electric Resistance Welded Boiler Tubes

(*Concluded from Page* 23)

failure has no relationship to the weld and when failure does occur in the weld, the bursting pressure indicates a fiber stress equivalent to that of the base metal. Every tube has expanded along its entire length before rupture, this expansion varying from 3.5 to 11.7 per cent of the original diameter of the tube.

As a further check on the strength of the weld, transverse tensile tests have also been made on a number of sizes of tubing. The following procedure was used in the preparation of the specimens:

Rings 1 in. wide were cut from each tube section. These rings were split opposite the weld, opened up, and flattened out for transverse tensile specimens with the weld in the center of the specimen. In order to note if the flattening and straightening operation of the test specimens had any effect on their tensile strength and elongation, one prepared test specimen from each tube was normalized at 1700 deg. F. before testing (marked "N"). Tube No. 1 (1-½ in. x 13 ga.) was too small for transverse testing. All test specimens were machined to 0.750 in. wide before testing.

The percentage elongation in 2 in. as determined by the transverse tensile tests is lower in all cases than the minimum elongation of 45 per cent in 2 in. mentioned earlier in this report as covering this class of tubing. This discrepancy is due to two causes, the use of a strip cut from the tube as a specimen, and the normal lower transverse ductility of all steel; but it is primarily the former as proved by longitudinal tensile tests made on specimens cut from the same length of tubing as the transverse tests. Tests made on full sections of tubing meet the 45 per cent figure; but the elongation is materially lower on the larger diameter tubes which had longitudinal strips machined from them for the tests. Earlier tests of the larger size tubes on full section made on a larger jawed testing machine conformed to the minimum elongation of 45 per cent in 2 in. Note also that there is little difference in elongation between the longitudinal and transverse tests when both tests were conducted on strips machined from the tubing.

Acknowledgment is hereby made of the valued assistance received from the Metallurgical Laboratories of Republic Steel Corpn., which conducted the tests.

TABLE III—Longitudinal Tensile Test of Tube Material

Tube No.	Size, in. OD	WT	Test Size	Yield Point lb./sq. in.	Ulti. lb./sq. in.	Per Cent Elongation 2 in.	4 in.	8 in.
1	1.500	0.100	Same	35,200	52,500	45.0	31.0	25.0
2	2.000	0.140	Same	30,600	48,500	67.0	51.0	40.5
3	2.000	0.100	Same	34,300	52,900	62.0	47.0	36.0
4	2.500	0.130	Same	33,000	51,100	67.0	50.5	39.0
*5	3.000	0.113	0.850 x 0.113	48,900	56,200	35.5	26.0	
T5	3.000	0.113	0.750 x 0.113	45,400	51,900	30.0	22.5	
*6	3.000	0.195	0.850 x 0.195	45,200	54,900	36.0	27.0	
T6	3.000	0.195	0.750 x 0.195	46,800	52,600	35.0	24.0	
*7	3.500	0.125	0.850 x 0.125	40,500	55,500	36.0	27.0	
T7	3.500	0.125	0.750 x 0.125	37,800	49,600	36.0	27.0	
*8	4.000	0.140	0.850 x 0.140	39,100	52,900	40.0	30.5	
T8	4.000	0.140	0.750 x 0.140	41,000	52,400	36.0	25.5	

Note: The diameters of tubes Nos. 5, 6, 7 and 8 were too large to enter the jaws of testing machine so longitudinal strips were machined from these tubes.

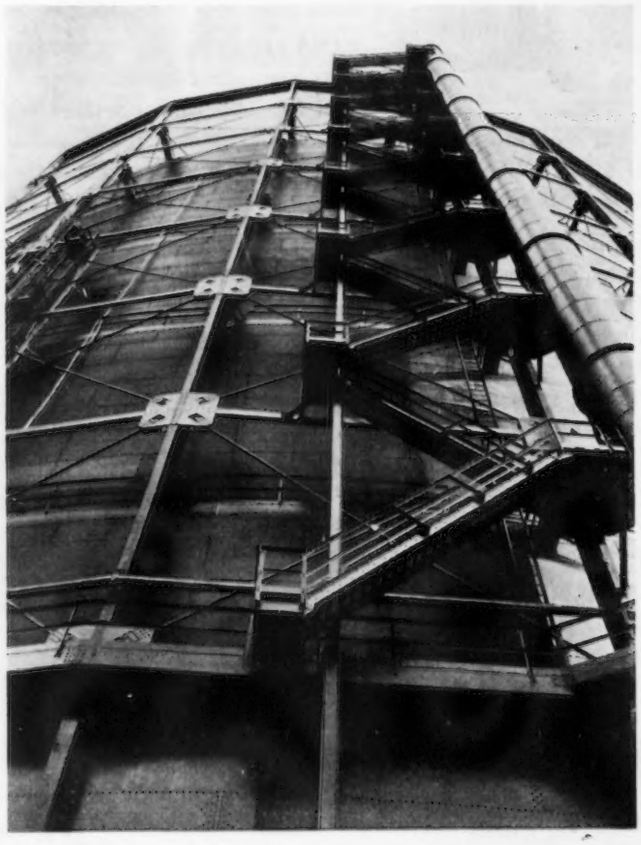
*—Strip taken opposite weld.
T—Strip taken in the weld.

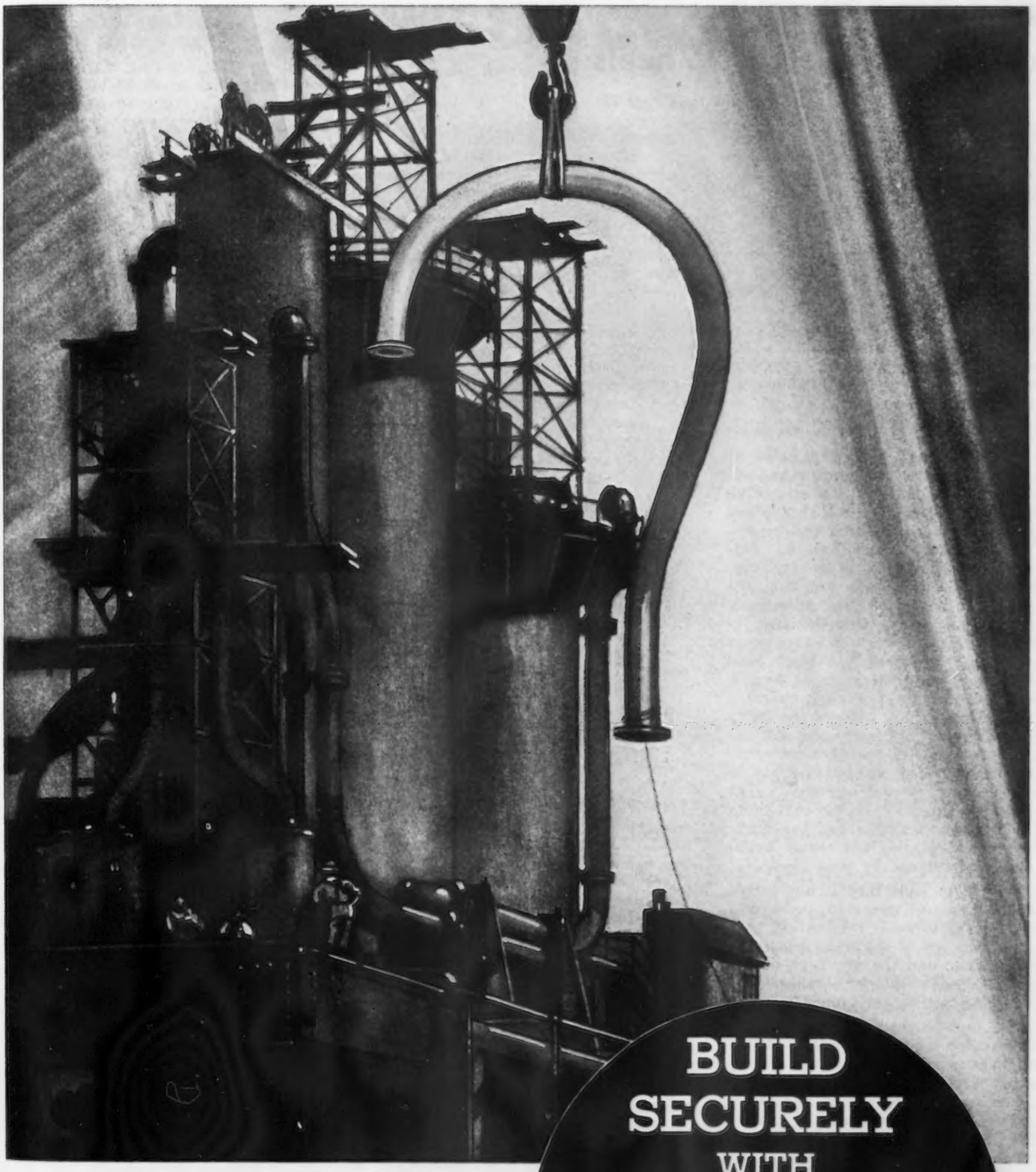
Unusual Features in Gas Holder

SEVERAL unusual features are incorporated in the construction of the gas holder shown in the illustration, which was recently manufactured and erected at the Point Breeze Station A of the Philadelphia Gas Works Co. This is a five-lift water sealed holder of the conventional type having a capacity of 10,000,000 cu. ft., and is contained in a tank 264 ft.-8 in. in diameter by 41 ft.-2 in. deep and guided in a frame of 26 columns and seven tiers of struts. The holder was manufacturerd and erected by the McClintic-Marshall Corpn. of Bethlehem, Pa.

Some of the features found in its construction that are not usually found in a gas holder of this type include the employment of electric welding in a variety of ways. The tank bottom was completely welded, the metallic arc process being employed. The guide frame columns are T-sections made by arc welding two beams together. Welding was also employed at many points in order to seal between members so as to prevent internal corrosion. Another unusual feature in the construction of the holder was the driving cold of all rivets in the tank shell, even though some were as large as 1⅝ in.

An elevator runs from the ground to the top of the guide frame, a piece of equipment not ordinarily found in a water sealed gas holder.





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BOILER TUBES HEAT EXCHANGER TUBES
CONDENSER TUBES STILL TUBES
REFINERY PIPING

PITTSBURGH STEEL CO.
Pittsburgh • Pennsylvania

Precision Control Features Heat Treating of Wrought Steel Wheels

(*Concluded from Page* 25)

of start of rotation is governed by an automatic time clock which can be set so that the intervals of rotation give any desired heating time. Rotation occurs in steps equal to the width of one door.

One wheel at a time is taken from the transfer platform and placed on the vacant portion of the hearth when the charging door opens. In the same way, at the proper moment, the discharging door is opened and a wheel, now at the proper quenching temperature, is lifted over to one of the two quenchers.

Quenching Water Sprayed on Rims

The quenchers, also designated as spinners, are two in number and operate independently. The quenching machine is so arranged that a wheel may be clamped between two revolving disks and rotated on its axis while water is sprayed on the rim. These disks protect the web from the action of the water thus preventing the setting up of objectionable internal stresses in the web where great strength is required. A steel hood encloses the revolving parts and is provided with an electrically operated sliding door which permits the entry or withdrawal of the wheel. All the movements on the machine are electrically operated and interlocked to secure their correct sequence. The process is started from the control on the charging machine and the duration of the rotation and water application is governed by time clocks.

Bethlehem feels that it has solved the problems of quenching in a way which gives superior results. In particular the use of water as a quenching medium and the provision of the special device which localizes the quenching action are emphasized.

The best hardening results are to be obtained when the material to be hardened is cooled through the critical range A_2-A_1 as rapidly as possible. Water was selected as a quenching medium for this reason. It can be obtained in large quantities which avoids the necessity of re-using the quenching medium. Practically all quenching methods other than water quenching necessitate the refrigeration of the cooling medium. Not only this but it is pointed out that the temperature of the medium in which the wheels are quenched varies through a much wider range when oil is used as compared with water.

Large variations in thickness such as are encountered in a wheel also introduce a hardening condition that must be considered. The proper quenching of the large mass of metal in the rim portion is likely to result in too drastic a quenching of the thin web. The Bethlehem process makes use of patented protection disks or shields which protect the thin web from being cooled too much during the quenching of the rim. At the same time the hub is left in the unhardened condition which is so necessary to avoid undue costs in machining.

When a wheel is transferred from the heating furnace, the door of the available quencher is opened by a control located on the charging machine. The wheel is then placed inside and gripped tightly in a vertical position by the protection disks which leave the rim exposed to the nozzle of the water spray. This done, the door is closed using the control on the charging machine again. As the door comes to the closed position it engages a limit switch which immediately sets in operation the automatically controlled equipment.

Two important special features characterize this quenching equipment. The first is the automatic control. From the time the door engages the limit switch every operation takes place at a pre-determined time through the medium of a time clock in the control room. The starting of the motor that rotates the wheel, the application of the water and the time of quenching are all made uniform in this manner for every wheel handled. The second is a precautionary measure. To avoid water impinging on the stationary wheel, thereby causing non-uniform hardness, several seconds are allowed to elapse after the wheel has been set in motion before the water valve starts to open. The same thing happens at the finish. The wheel continues to rotate after the closing of the valve until the pipe between the valve and spray has had a chance to drain. During the actual quenching period the wheel is rotated at a uniform rate under the spray.

After quenching the wheel is transferred to the drawing furnace, a movement which must be in a minimum amount of time to avoid any chilling action by the air.

Two Rotary Drawing Furnaces

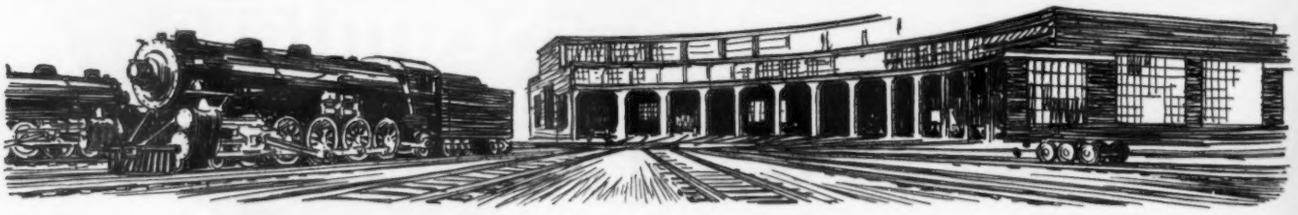
The drawing furnace is similar in design to the heating furnace except that a combustion chamber is placed above the hearth and separated from it by a perforated arch. This construction makes possible the uniformity of temperature in the furnace so important to this process. The furnace is divided into three zones in which a constant temperature of 950 deg. F. is automatically maintained. This furnace is 32 ft. 5 in. in diameter outside the brickwork. The rotary hearth is 7 ft. 3 in. wide with a mean diameter of 21 ft. and has a capacity of 30 36-in. diameter passenger car type wheels. As a result of the smaller diameter of the furnace it is necessary to place the driving machinery outside. The details of operation are the same as in the case of the heating furnace.

After drawing, the wheel is removed to the second transfer platform, picked up by another overhead crane and placed in the cooling pits where it remains until it cools down to room temperature. This is done solely for the purpose of protecting the wheel from possible drafts, a consideration which is particularly important in cold weather.

Time clocks, potentiometers and all related electrical equipment are located in a separate control room.

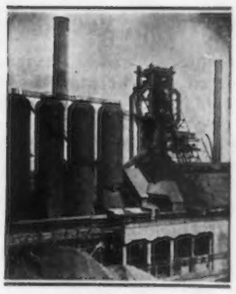
The capacity of the plant is rated at 15 wheels 36 in. in diameter, passenger car type, per hour. Provision has been made to heat treat wheels up to 54 in. diameter. It may be added that every wheel blank is annealed to refine its structure and eliminate stress before the forging operations and subsequent rolling on the wheel mill, a preliminary treatment that is of course independent of the treatment here described.

All in all the new heat-treating unit is an exceptional example of modern treating practice. From the standpoint of looks, operation and results it appears to measure up in every way, and an important point to be stressed is the automatic control of temperature in the heating, quenching and drawing stages.

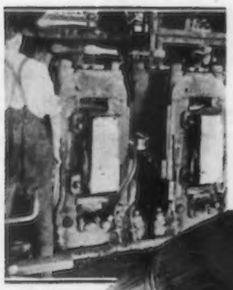


WISSCO has BACKGROUND

Mining



Smelting



Rolling

Patenting

Wire Drawing

QUALITY is not born in wire overnight . . . it comes only as the result of much research over a period of years. Wickwire Spencer, with nearly a century of background, has met the most exacting requirements in practically every industry that uses wire. WISSCO WIRE of today is the improved product that reflects this experience, that incorporates the every advancement in the art of making Quality Wire.

In order to hold its product to the highest standards, this company has found it necessary to perform every step in wire making within its own walls. The result . . . uniformity. WISSCO WIRE is worthy of its background.

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WISSCO WIRE
by Wickwire Spencer

Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire—Valve Spring—Music—Clip—Pin—Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—Machinery Spring Wire—Reed Wire—Clock—Pinion—Needle-Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wissco technical man on your wire problems, however large or small.

A quality product demands the quality of GOHI Sheet Metal

A PRODUCT made of metal can be no better than the metal itself. That's why you need GOHI Sheet Metal. For more than twenty-five years it has been the economical, high-quality ferrous metal.

A Pure Iron with the right amount of Copper added, GOHI is unusually resistant to rust, wear, weather, and corrosion.

Soft, homogeneous, ductile, it is easy to cut, stamp, draw, seam, bend, form, and weld. All of which means that with GOHI Sheet Metal you can do two important jobs — improve quality and cut production costs.

THE NEWPORT ROLLING MILL CO.
Newport, Kentucky

GENUINE OPEN HEARTH IRON — GOHI — PURE IRON - COPPER ALLOY

GOHI
PRONOUNCED "GO-HIGH"
SHEET METAL

JUST BETWEEN US TWO

Maybe It's Done With Mirrors

Two issues ago we gently chided the Coast small shop proprietor who asked us where he could get a ¼" pipe that would admit a ⅜" cold rolled rod. We implied it was a neat trick if it could be done, and now comes Clarence Hamer of Herkimer, N. Y., and implies it can be done. Says Mr. Hamer:

"When I was a farmer boy engaged (on rainy days) in building a small dynamo, I did not have the two dollars demanded by the local machinist for the shouldered shaft with threads on shoulders for drawing up the armature core laminations. So I conceived the idea of using a piece of iron pipe with both ends threaded, and a ⅜" cold rolled shaft.

"To my surprise the plumber informed me that a ⅜" pipe was much too large, and that I should use ¼" pipe. The ¼" pipe proved to be a nice driving fit on the ⅜" shaft.

"In hand books the inside diameter of ¼" pipe is given as .364". Since stock sizes often run slightly large, the proprietor of the small shop on the Coast is not so far off after all."

Is our face red, even if our column is not!

He Ordered $8,000 Worth

A certain used machinery firm had the job of selling the equipment of a defunct plant. An ad was run in The Iron Age. Later our representative called to try to get some more advertising. He said he had a long wait.

But he bided, bid or bode, whichever is correct, his time, for he noticed the firm was busy with possible customers, and this is no time to scare away even impossible customers. Just to prove that patience is sometimes rewarded, listen to this, in the rough language of an advertising salesman:

"The wait was worth while for they had got good results from their last ad. They told me one chap came in with The Iron Age ad in his hand, stayed three days and bought $8,000 worth of machinery. They were greatly pleased."

Fie on These Suspicious Gentlemen!

If, Lord forbid, you should ever have occasion to place any advertising, you will find yourself bewildered with the competitive pie charts, graphs, "we-cover-the-field-like-a-blanket-code" maps, and so forth every advertising man carries.

If you are a credulous soul the more you investigate the more confused you will become. For if every advertising salesman did not believe, down to his last hemoglobin that his publication was absolutely the outstanding paper, civilization would totter and death would be too good for the so-and-so.

But some people are suspicious. They can't see how papers A, B, C and D can each be the best in the field. So they do the highly unconventional thing of brushing aside the pie charts, graphs, pretty statistical tables, etc., and ask their customers the simple question:

"Which paper do you prefer?"

Within the past two years or so 35 of these investigations conducted by advertisers have come to our attention. We have not always come out on top, but in 25 of the 35 investigations we are No. 1, usually by a healthy margin.

If we don't happen to come in first, or if a competitor should find himself 'way down the ladder, the only thing left to say is what the Hoover campaign managers said when they saw the results of the Literary Digest's presidential poll, "Maybe sentiment has changed since the poll was made."

Here's one that does not admit of even that faint hope.

A certain manufacturer of an article used in every machine shop made a reader-interest survey two weeks ago. We haven't seen the final figures yet, but he writes:

"The Iron Age leads a list of about nine or ten publications."

An ounce of investigation is worth a yard of figures, or something.

Idea for a Cartoon

Show a dignified, silk-hatted, Peter Arno-ish old gentleman stopping to purchase fi' cents peanuts from a dismal Sicilian push-cart vendor. Old gentleman starts in dismay and says, "What, no blue eagle?!"—A.H.D.

NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

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LOOK FOR

FLEX-AU-MOBILITY

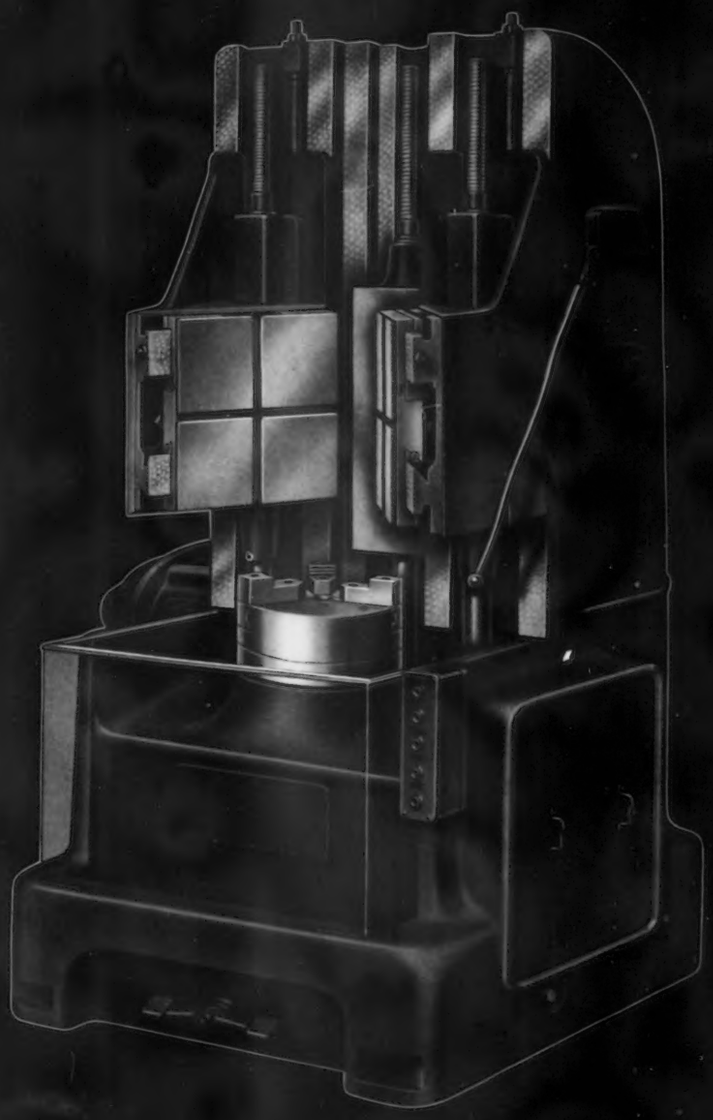
of

MACHINE TOOLS

FLEXIBILITY—
AUTOMATICITY—
MOBILITY—

Industrial Recovery codes are increasing the needs for Flex-Au-Mobility of shop equipment.

Rehabilitation with Bullard Single Spindle Automatic Vertical Lathe provides this feature with its attendant Economy, Efficiency, and Quick Return on the investment.



ASK ABOUT

BULLARD

SINGLE SPINDLE
AUTOMATIC VERTICAL LATHE

THE
BULLARD
COMPANY
Bridgeport,
Conn.

How WHITMAN & BARNES Make Good Drills

THE good quality of Whitman & Barnes Drills is the result of good steel and good heat-treatment. This good heat-treatment is attained with six Hoskins Electric Lead Pots. In these electric pots, they harden all their carbon drills of a size that can be handled in a fixture. The drills have a uniform hardness and toughness because their heat-treatment is uniform in these Hoskins Electric Pots. And the heat-treat room is much cooler than before. If interested in electric heat, ask for Catalog 531. HOSKINS MFG. CO., DETROIT

Chromel
The Wire that Made Electrical Heat Possible

HOSKINS
Electric
FURNACES

Chromel
The Wire that Made Electrical Heat Possible

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